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B O S T O N U N I V E R S I T Y

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Dissertation

S O M E O B J E C T I V E A S P E C T S O F A U R A L A C U I T Y

by

Charles Henry Lutz

(S. B., Massachusetts Institute of Technology, 1930)

(S. M., Massachusetts Institute of Technology, 1932)

submitted in partial fulfilment of the

requirements for the degree of

Doctor of Philosophy

1934

ROBERTS UNIVERSITY

RESEARCH SCHOOL

Thesis

SCIENTIFIC ASPECTS OF AGRICULTURE

by

Charles Henry Jones

(M. Sc., Massachusetts Institute of Technology, 1934)

(B. Sc., Massachusetts Institute of Technology, 1932)

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To Dr. Dana W. Drury, Dr. Allan W. Rowe and Dr. Dana W. Drury and Dr. Dana W. Drury whose encouragement and advice have made this work possible. and advice which could not have been obtained otherwise. It was with a pleasure indeed to be so closely associated with him.

To Professor E. A. Hunt and Dr. J. E. Taylor, the author wishes to acknowledge his appreciation for their interest in the study and their helpful suggestions after reading the paper.

The cases reported here were made available through the kind cooperation of Dr. Stanley Cobb of the Neurological Service and Dr. Donald Moore of the Neurosurgical Service of the Boston City Hospital and the author wishes to express his gratitude for their material assistance.

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I N T R O D U C T I O N

The study of the ability of the ear to detect sounds of very small intensity has long been of interest to members of the medical profession specializing in diseases of the ear. Far back in the ages one may find documents of those savants who were interested in the manner in which members of the animal kingdom were able to hear. Later, as medicine became more organized in a systematic fashion, the interest became more keen because it was found that the normal hearing ability might be lost and thus a person rendered either partially or entirely void of this special sense of contact with the outside world. At first the view was more or less prevalent that the condition of deafness was an entity entirely involving the organ of reception, the ear. That viewpoint is to-day somewhat replaced although one finds many evidences of it still remaining.

The fact being established that it is possible for this organ to become pathologically involved and the sense to be impaired or entirely lost, it becomes of extreme importance to have at hand a ready means of determining if impairment be present and also the amount of functional loss. The classical method of diagnosis rested on the use of tuning forks, a Galton whistle or an accoumeter (described in Section IV) which had previously been standardized on a person with no apparent aural pathology. This method of testing was the only one possible up to about 1920 and is still in use by the large majority of practitioners although the advance of scientific knowledge has placed at our disposal a far more accurate and more convenient method in the instrument known as the audiometer, which will be described later, (Section IV).

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INTRODUCTION

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ing of this unit away from its normal course. Dr Dana W. Drury, who has been my guide and mentor in this research, is very positive in his belief regarding this. He feels that the ear, with our present accurate means of testing acuity, is of very great value in a diagnosis of the functional level of the body in general. He has shown that aural acuity is depressed by bodily failure even though there is no explicit dependence of the hearing apparatus on the pathologically involved portion.

The thesis of this paper is to extend this view to cases which have not been previously dealt with and to show the relation of aural acuity to established neurological disorders. The cases presented are from the Neurological and Neurosurgical Services of the Boston City Hospital and all medical data presented are taken from the hospital records.

The form of presentation chosen is to set the material forth in the following order: (1) The Anatomy of the Organ of Hearing, both gross and microscopic; (2) The Physiology of the Function of the Organ; (3) Theories of Hearing; (4) The Case Reports, which shall include a rather detailed discussion; (5) Conclusions drawn from the study, with suggestions for further research. It is felt that this manner of presentation should be used as it gives the known facts concerning the form of the organ and its parts, then the function carried out by them. With these facts one is prepared to formulate a theory of the action of the organ. With this as a background one may then consider the effects of pathological disorders on the organ.

Before commencing the work of the dissertation it seems fitting to say a brief word regarding the relation of the two fields - Medicine and Physics. It is altogether fitting and proper that a physicist should conduct a research of this sort since it points out the type of instruments which should

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be developed, and many other lines of research of value to the medical profession. Thus it will give to medicine the advantages of scientific development in the field of physics. It is, however, important that one engaging in this type of research have sufficient fundamental knowledge regarding medicine so that he will realize that he is dealing with a human and not a piece of laboratory apparatus. It is to be hoped that a combination of these fields may lead to advances in our knowledge comparable with those made when chemistry was applied to medicine to give rise to our present school of biochemistry. Thus, as A.V. Hill* points out, many of the fundamental problems of physiology are in reality problems which must be attacked by the methods of theories of physics.

A comment should be made concerning the bibliography. A considerable number of references are recorded which have been read in connection with this work. Among these are some which offer points quoted in the Dissertation. Such quotations will be cited and the source noted. By far the larger number, however, have served a passive role and whether they served in forming positive or negative reactions they have all contributed to the formulation of the problem as set forth in the following paper.

* A. V. Hill - Adventures in Biophysics.

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SECTION I

THE EXTERNAL EAR

The external portion of the external ear is a very familiar object. It consists of the cartilaginous mass presenting a pyriform outline and found on the outside of the pinna. The auricle is, generally speaking, a process of the skin with this process directed forward and outward. This aspect of the auricle is divided into several portions by irregularities. The upper edge is the helix which rises to the superior anterior portion of the auricle and then curves along the periphery to give way at the inferior posterior part to that portion known as the lobule. Just inside it is a small, prominent portion which follows a course almost parallel to the helix and is termed the anti-helix.

PART I

At the superior border of the lobule is a slight prominence known as the ear ridge. The medial surface of the ear is marked by a slight ridge, the tragus, which projects upward and slightly forward. There is a deep depression, called the scapha, which opens into the external auditory meatus.

ANATOMY OF THE EAR

The function of this portion of the ear is rather in doubt. If it serves as a sound gathering device the following the sound waves into the external meatus, it is only useful for high frequencies. It is possible that in lower sounds it is more useful than it is in any other way.

The entire structure is cartilaginous and averages about 2 cm. in thickness. It is supported by muscles which are more or less innervated and serve to hold the organ stationary in position. In animals such as the dog, horse, etc., these muscles are voluntary and the auricle may be moved as desired. Man has organs that still give the auricle some degree of freedom in selecting sounds and that it also helps in identifying the

PART I

ANATOMY OF THE EAR

SECTION 1

THE EXTERNAL EAR

The exposed portion of the external ear is a very familiar object. It consists of the cartilaginous mass presenting a pyriform outline and known as the auricle or the pinna. The auricle is, generally speaking, a concave surface with this concavity directed forward and outward. This aspect of the surface is divided into several portions by irregularities. The external edge is the helix which rises in the superior anterior portion of the concha and then continue along the periphery to give way at the inferior posterior part to that portion known as the lobule. Just inside is a convex, protruding portion which follows a course almost parallel to the helix and is termed the anti helix. This terminates at the superior border of the lobule in a slight prominence known as the anti tragus. The medial anterior limit of the ear is marked by a slight nodule, the tragus, which projects outward and slightly backward. The central portion of the pinna is a deep concavity, called the concha, which opens into the external auditory meatus.

The function of this portion of the ear is rather in doubt. If it serves as a sound gathering device for deflecting the sound waves into the external meatus, it is only useful for high frequencies. It is possible that in lower animals it is more useful than it is in man.

The entire structure is cartilaginous and averages about 2 mm. in thickness. It is supported by muscles which in man are more or less inactive and merely serve to hold the organ statically in position. In animals such as the dog, horse, etc., these muscles are volitional and the auricle may be oriented as desired. One may argue that this gives the animal greater freedom in detecting sounds and that it also helps in localizing the

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point of origin.

As was mentioned before, the deep portion of the concha gives way to the external meatus which penetrates inward into an opening provided in the temporal bone. The inward course of the canal is by no means straight. Apparently the tortuosity of the course serves to prevent the passage inward of objects which might injure the membrane. The canal is about 3 cm. in length and is divided into two portions by a constriction, the isthmus, about a third of the distance inward. The external portion is a continuation of the cartilage of the pinna while the inner two-thirds is a bony canal.

Beneath the surface of the lining membrane of the outer portion is a layer of glands which secrete the yellow-brown wax which one encounters in the canal. The obvious utility of this substance is for protection against the inward progress of insects or small foreign bodies which might enter the canal. Since it is extremely viscid it can easily prevent such progress inward. Although it serves a protective function it may become hardened there and give rise to trouble. An impacting of this sort causes a hearing loss, particularly for the low frequencies, as if it extends inward sufficiently to contact the tympanic membrane it may cause severe pain.

The inner portion of the meatus is osseous, the bones being invested with only a delicate cutis united to the periosteum. As the canal progresses inward it becomes slightly widened just before its internal terminus is reached. The inner end of the tube is closed by the tympanic membrane which serves as the boundary between the outer and middle ears. There is little more of interest concerning the canal and attention is now directed to the remaining element of this portion, the tympanic membrane.

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This is the part of the ear observed by looking into the canal with a speculum and suitable light source. It appears of a pearl-grey color and presents a few features which are useful in diagnosis of certain types of pathology of the conduction apparatus. The outline of the membrane is in general elliptical, with its major axis directed approximately upward and downward, and the minor axis normal to this; but considerable variations are encountered in different individuals. The plane of this membrane is not at right angles to the axis of the canal but is set obliquely so that it slopes downward and inward while it also slopes forward and outward at a lesser degree. Nor is the membrane flat; it presents, instead, a concave surface, the deepest portion of the concavity being at the center where the malleus is attached. This depression is known as the umbo. Leading downward and forward from the umbo is a lighter colored, coneshaped portion having its vertex at the umbo. This is known as the cone of light and is caused by light reflected on the curved membrane from the walls of the canal. Leading upward from the umbo one can see the outline of the handle of the malleus which terminates at the short process of the malleus before reaching the periphery. Just superior to the termination of the handle is seen a different appearing part of the membrane. This portion is not stretched taut, as is the remainder of the membrane, and accordingly is known as membrana flaccida or Shrapnell's membrane. It is formed by a notch (the notch of Rivini) where the bony ring to which the membrane is attached, is not complete.

The entire membrane is composed of three layers; the outer is a layer of delicate, cuticular covering; the middle layer is fibrous and is composed of two separate laminae, the external radiating lamina and the internal

This is the part of the ear observed by looking into the canal with a speculum and suitable light source. It appears of a greenish-grey color and presents a few features which are useful in diagnosis of certain types of pathology of the middle ear apparatus. The outline of the membrane is in general elliptical, with its major axis directed approximately upward and downward, and the minor axis normal to this; but considerable variations are encountered in different individuals. The plane of this membrane is not at right angles to the axis of the canal but is not obliquely so that it slopes downward and inward while it also slopes forward and outward at a lesser degree. For the membrane itself is flattened, instead, a concave surface, the deepest portion of the concavity being at the center where the malleus is attached. This depression is known as the umbo. Leading downward and forward from the umbo is a lighter colored, somewhat horizontal having its vertex at the umbo. This is known as the cone of light and is caused by light reflected on the curved membrane from the walls of the canal. Leading upward from the umbo one can see the outline of the handle of the malleus which terminates at the short process of the malleus before reaching the periphery. Just superior to the reflection of the handle is seen a different appearing part of the membrane. This portion is not stretched taut, as is the remainder of the membrane, and accordingly is known as the pars flaccida or Shrapnell's membrane. It is formed by a notch (the notch of Rivini) where the body ring to which the membrane is attached, is not complete.

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circular stratum, interspersed with connective tissue cells; the inner lining is a mucosa which is continuous with the mucous membrane lining the tympanum. The membrane is approximately 0.1 m.m. in thickness but in spite of this is almost inextensible.

SECTION 2

THE MIDDLE EAR - TYMPANUM

The next portion of the ear to be considered is the middle ear or tympanum. This is a cavity in the temporal bone which contains the apparatus for conducting sound waves from the tympanic membrane into the labyrinth. The cavity is connected to a smaller superior cavity, the attic, which is in turn connected to another cavity, the mastoid antrum, this being the largest of the numerous air cells found in the mastoid portion of the petrous bone, all of which are interconnected. The entire cavity is lined with mucous membrane and is filled with air.

Situated within the tympanum are three extremely small bones known as the ossicles. These are joined together by synovial lined joints and supported by ligaments. The outer extremity of the chain is connected to the drum head while the inner end communicates with the labyrinth through the oval window. These bones are, from within outward, (1) the stapes or stirrup, (2) the incus or anvil, (3) the malleus or hammer. The following table gives average values of their weights and illustrates their minuteness.

The malleus is roughly a club shaped bone which has a long handle which gives way to a constricted neck and the a larger, rounded head. The manubrium, or handle, is connected directly to the fibrous layer of the drum-skin, being situated between the fibrous and mucous lamellae. The

circumferential, interspersed with connective tissue cells; the inner lining is a mucous which is continuous with the mucous membrane lining the tympanic. The membrane is approximately 0.1 m.m. in thickness but in spite of this is almost inextensible.

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tip of the handle is located at the umbo, with the handle pointing upward. At the superior margin of the handle a muscle, which will be discussed below, is attached to a small prominence known as the processus brevis. The neck of the malleus is located at about the height of Shrapnell's membrane, that is, approximately at the superior margin of the tympanic membrane. Above this is the head which extends into the upper chamber, the attic. The posterior aspect of the head has a surface which is covered with cartilage and forms the articulation with the body of the incus.

TABLE I

Stapes	0.002 grams.
Incus	0.025 "
Malleus	0.023 "

The superior surface of the head is connected to the roof plate by means of fibrous tissue, the superior or suspensory ligament of the malleus. The anterior ligament of the malleus is joined to the anterior aspect of the head and neck and connects with the anterior wall of the tympanum. The external ligament is attached to the neck at one end while the other end spreads out to join the wall at the notch of Rivini and gives the ligament a fan like appearance. The fourth ligament attached to the malleus is the internal, which is attached to the internal surface of the root of the handle and the internal wall of the tympanum. The latter three ligaments serve to limit the movements of the malleus, while the first mentioned fulfils this function and also serves to support this member of the chain.

There is also a small muscle attached to the malleus. This muscle, the tensor tympanic muscle, issues from a canal in the interior wall of the tympanum and then turns to cross the tympanum and ends in an attachment about the handle of the malleus near its root. The action of this muscle

tip of the handle is located at the umbilicus, with the handle pointing upward. At the superior margin of the handle a muscle, which will be discussed below is attached to a small prominence known as the processus pyramidalis. The neck of the gallbladder is located at about the height of the umbilicus, that is, approximately at the superior margin of the pyramidal process. Above this is the head which extends into the upper chamber, the cystic. The posterior aspect of the head has a surface which is covered with cartilage and forms the articulation with the body of the uterus.

TABLE I

Stomach	0.002 grams
"	0.002 "
"	0.002 "

The superior surface of the head is connected to the roof plate by means of fibrous tissue, the superior or suspensory ligament of the gallbladder. The anterior ligament of the gallbladder is joined to the anterior aspect of the head and neck and connects with the anterior wall of the pylorus. The external ligament is attached to the neck at one end while the other end spreads out to join the wall at the notch of the pylorus and gives the ligament a fan like appearance. The fourth ligament attached to the gallbladder is the internal, which is attached to the internal surface of the roof of the head and the internal wall of the pylorus. The latter three ligaments serve to limit the movements of the gallbladder, while the first mentioned limits this function and also serves to support the neck of the organ. There is also a small muscle attached to the gallbladder. This muscle, the tensor pyramidalis muscle, issues from a canal in the interior wall of the pylorus and then turns to cross the pylorus and ends in an attachment about the handle of the gallbladder near its root. The action of this muscle

will be discussed in the section concerning the physiology of the ear.

The next link in the chain is the incus or anvil, which is, referring to Table I, the largest of the ossicles. This bone resembles a rough bicuspid molar with the roots diverging to considerable extent. It was noted above that the posterior aspect of the head of the malleus articulated with the anvil. This occurs at the body where the incus presents a concave surface to be joined to the head of the malleus, a synovial membrane occurring between the surfaces and a capsular ligament surrounding the joint. Passing backward from the body toward the mastoid antrum is a short protrusion, the short process, which is joined to the posterior wall of the tympanum by fibrous tissue called the ligament of the incus. From the anterior portion of the body a second process extends downward almost parallel to the handle of the malleus but inward and slightly posterior to it. This process is known as the long process and terminates in a small, knurled projection which furnishes a connection with the stapes. This joint also has a synovial membrane and is surrounded by a capsular ligament.

The last and smallest member of the chain is the stapes which is shaped somewhat like a stirrup. The head articulates with the long process of the incus and then gives rise to two crura which diverge as they leave the neck and pass backward to connect with the foot plate. The foot plate fits into an opening in the inner wall of the tympanum which is oval shaped and hence is termed the fenestra ovalis or oval window. The foot plate is joined to the margin of the window by a band of fibrous tissue. A muscle is attached to the neck of the stapes which arises from a canal in the posterior portion of the inner wall. This is the smallest muscle of the body and is called the stapedius muscle.

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Slightly below the oval window is a second opening which communicates with the labyrinth. This opening is round in outline, hence the fenestra rotunda, and is closed by a thin membrane. The function of this will be considered later.

An opening in the anterior portion of the inner wall leads forward toward the pharynx. This is the tympanic orifice of the Eustachian tube and in this portion is entirely osseous in formation. About one-third of the distance toward the pharyngeal end it becomes somewhat constricted and then gives way to the cartilaginous portion. This portion has a long, narrow lumen and increases in size as it runs toward the pharynx, obtaining its maximum size at its pharyngeal opening. The tube is normally closed at its pharyngeal end but is opened by swallowing or yawning so that the middle ear pressure may be regulated volitionally through the naso-pharyngeal and Eustachian tube route. This close association of the naso-pharynx and middle ear explains the reason for ear complications which may develop from an upper respiratory infection.

SECTION 3

THE INNER EAR - LABYRINTH

The inner ear, to which attention is now directed, is undoubtedly the most important part of the ear to those interested in the theory of hearing. As is usual, the most interesting is the most difficult to approach, and consequently experimental work is possible here only with great difficulty. This portion of the organ is located in the hardest bone of the body and consequently it is extremely difficult to approach experimentally. Even if the approach be made by a skilful surgical procedure it no longer

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leaves the organ in the same physical or physiological condition. This, then, dictates that the only means of study of the function must be carried out in an indirect manner. There are thus two methods which may be employed. The first of these would be an indirect physiological study which will be considered in detail in a later section. The second method is to consider the anatomy in detail and from the structure, distribution and physiological limitation known to apply in general, deduce the possible method of function. It is this detailed study of the anatomy which is now considered.

In previous portions the anatomy has been considered only in regard to gross structure. This is not possible in dealing with the cochlea since the organ is so small that it would yield nothing of value. Instead, the description must include a microscopic study of the parts. This will be facilitated by the inclusion of several plates which show in detail the various structures and thus gives a tangible background for the discussion of the function.

The internal ear is formed by a number of canals which pierce the dense petrous portion of the temporal bone. This entire system of canals is known as the labyrinth and has a twofold function, so the system may be arbitrarily divided into two portions. The one of these has to do with the spacial orientation and equilibrium of the body and is known as the vestibular apparatus. It consists of three canals, each approximately semicircular, which are oriented in three planes nearly normal to one another, thus giving equilibrium reactions in any plane of motion. These are the semicircular canals and are called the superior, the posterior, and the external semicircular canals. Since this entire system has no connection with the function of hearing and no research was done on it in this study, no more consideration will be given it. The other portion of the canal network is

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known as the cochlea and is concerned only with hearing; it will now be considered in detail.

If a cast were made of the canals forming this portion it would have the appearance of a snail, hence the name cochlea. This part of the labyrinth lies anterior to the semicircular canals and is oriented in the bone so that the apex points somewhat downward and forward. Before beginning with the anatomical details it seems worth while to mention that the two portions of the ear not only serve different functions but also that they represent vastly different ages in the phylogenetic development. Thus the vestibular apparatus may be traced in the scale very far back while the auditory apparatus has been acquired at a very much later date. It is, in fact, the most recently acquired special sense. This means that even though the two are so closely connected anatomically, the cochlear portion will be more readily attacked by toxemias than the other. Without doubt, the cochlear function is more readily attacked than any other of the special senses and consequently is more valuable as a guide to the functional level of the body.

The general form and orientation of this part is shown in Plate I. The central portion, about which the canal spirals upward, is the modiolus. It is pierced by numerous small channels which permit the passage of nerve fibers to the end organ and terminates at the upper end in a hook-shaped opening called the homulus. In the passage upward the canal of the cochlea makes two and one-half turns about the modiolus. It is seen that an osseous shelf projects out into the lumen of the canal from the midpoint of the inner wall. This is the spiral lamina and has partially divided the lumen of the canal into two portions.

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Arising from the free edge of the spiral lamina is the basilar membrane which stretches across to the outside wall, which it contacts at about the midpoint, and completely divides the lumen of the canal into two portions. The upper ends of these two scalae are in communication through the opening in the upper end of the modiolus, the helicotrema. The lower scala is not changed by any further development whereas the upper one is again subdivided. The basilar membrane is extremely important in the Helmholtz theory and will be discussed at length. Plates II and III show its location.

Rising from a point on the superior surface of the spiral lamina and slightly inward from the free end is Reissner's membrane. This extends across the upper gallery, inclined at some 30 degrees to the basilar membrane, until it joins the opposite wall of the cochlea. The appearance of this membrane is considerably different from that of the basilar. It is of a very delicate structure and from the impression gained from microscopic sections it is normally in a flaccid state. Thus the lumen of the cochlea has been divided into three portions and a structure lying on the upper surface of the basilar membrane is isolated in the middle duct which is blind at either end. The upper is the scala vestibularis; the median is the scala media, or the ductus cichlearis; the lower is the scala tympani.

The point of attachment of the basilar membrane to the outer wall is not a mere anastomosis with the bony wall but is connected by the spiral ligament. This ligament is differentiated in size from base to apex and from the appearance is capable of supporting considerable tension. The differentiation in the size of the ligament immediately suggests that there is a concomitant variation in tension in the membrane. Also, since the ligament is larger at the basal end, this would lead to a variation in keeping

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with that required by the resonance theory. The basilar membrane is also subjected to a second variation - a variation in width. Thus, the width at the basal end is in the vicinity of 0.17 mm. compared with 0.45 mm. at the apical end. This is considerably different from the values accepted at the time Helmholtz formulated his theory. The values then accepted were 0.041 mm. and 0.495 mm. Thus he considered there was a twelve to one ratio, whereas there is a ratio of only about three to one. The length of the basilar membrane, if it were removed and straightened out would be about 35 mm.

If the basilar membrane be removed and a longitudinal section cut from it and prepared for microscopic study, a number of concentric circular structures would be seen lying side by side along its length. These are the cut ends of the transverse fibers. It is evident, then, that the membrane is apparently able to sustain a transverse tension such as would be required by the resonance theory. No fibers are seen to run in a longitudinal direction so that there is apparently no tension along its length, although the fibers are immersed in a continuum.

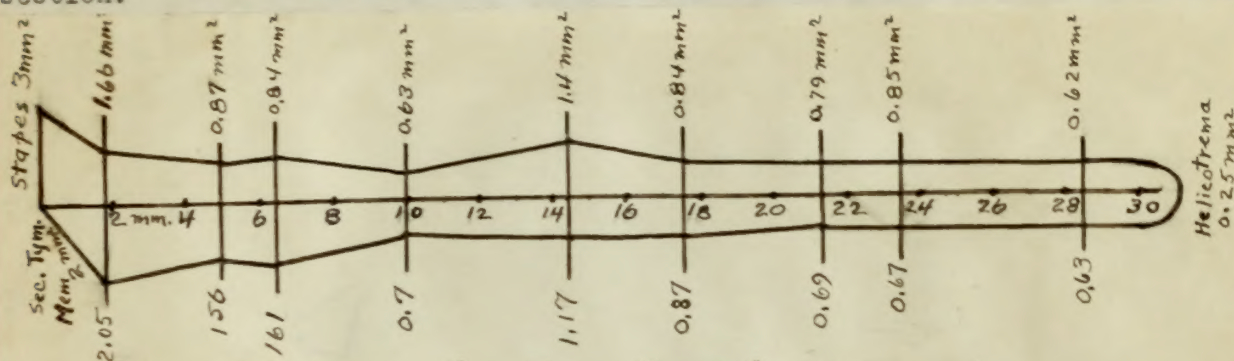
The size of the osseous canal is not uniform as it progresses from base to apex but decreases in cross section as the spirals wind upward. In the basal whorl where the fenestrae give functional connection to the tympanum, the size is about 1.0 mm. It is immediately noted that these magnitudes are extremely small. Further, the canal is divided into two principal scalae, the sizes of which are represented in the following figure. The size of the canals in which the fluid motion is to take place must be considered as limiting the possible type of motion to a considerable extent. Thus, if there were to be a mass motion of the fluid in canals of this size, the friction would be excessive and the variation in cross section would lead to a non-uniformity of the velocity, if the liquid be assumed as incompress-

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sible. From a physical standpoint this would merely mean the application of Bernoulli's Principle. This will be considered in some detail in a later section.



Size of the Cochlear Ducts

(Figure 1)

The plates II and III show that there is a complex collection of cells lying on the superior aspect of the basilar membrane. These cells are arranged in a very definite pattern and are known collectively as Corti's Organ. Here are located the sensory endings of the acoustic nerve. This is the most important part of the cochlea and it is necessary to consider it in great detail. Histologists, following Corti's original publication, were extremely busy for a number of years studying the finer details of the structure and contributing their findings to the profession.

The organ is located on the side of the basilar membrane slightly nearer to the spiral lamina than the spiral ligament, the outer end of the organ lying near the middle of the membrane. At the free end of the organ a series of cells are seen to be arranged in a regular fashion. These are piled one layer deep at the extremity and then increase in height so that the profile presents a sharp convexity rising in height to such a degree that at the inner margin of these cells the extreme height of the organ is reached. The cells forming this collection were described by Hensen and because of

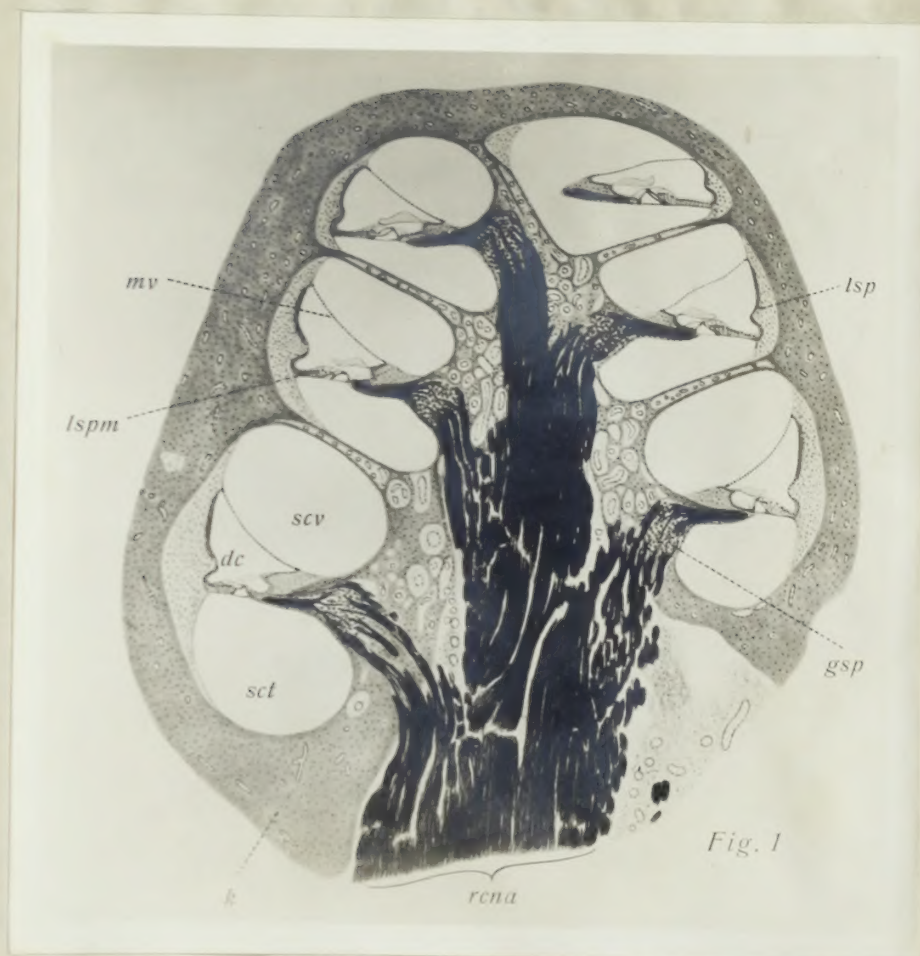
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- mv - - Reissner's membrane
- lspm - Basilar membrane
- scv - Scala vestibularis
- dc - - Ductus cochlearis
- sct - Scala tympani
- lsp - Spiral ligament
- gsp - Spiral ganglion cells
- rcna - Cochlear nerve
- k - - Osseous housing.

PLATE I

their apparent function are called the supporting cells of Hensen.

Lying inward from the supporting cells is a second, well defined collection. This is divided into two layers, the cells in the bottom lamina differing in structural appearance from those in the upper. Due to this different structure the two sets are supposed to have a different function, which is also justified by the nerve connections which are discussed below. The lower layer is formed by elongated, rod-shaped cells which are packed one layer deep and appear to form a substructure for the upper cells. The upper cells, supported by the substructure, reach upward so that their free ends lie at the same height as the highest point reached by Hensen's supporting cells. These cells are only one layer in depth and three or four are placed side by side, as is seen in the plates which represent a transverse section of the organ. The upper ends of the cells present an interesting feature. Cilia are given off which project a little distance above the level of the cells. These are supposedly the activating mechanism of the nerve process of audition. The cells of the lower layer are called Deiter's Rods, while those of the upper, due to the ciliated process given off, are known as the outer hair cells. The hair cells are separated from direct contact with one another by small protoplasmic portions of Deiter's Rods which extend upward into the upper layer.

Inward from the above collection lies a pattern which is formed from two extremely long, rod-shaped cells. The bases of these are separated some little distance in their place of implantation on the basilar membrane while the tops, due to the mutual inclination of the two rods, are joined together. The upper point of contact is not a loose, superficial joint, but an articulation which makes for great stability and apparently only permits motions

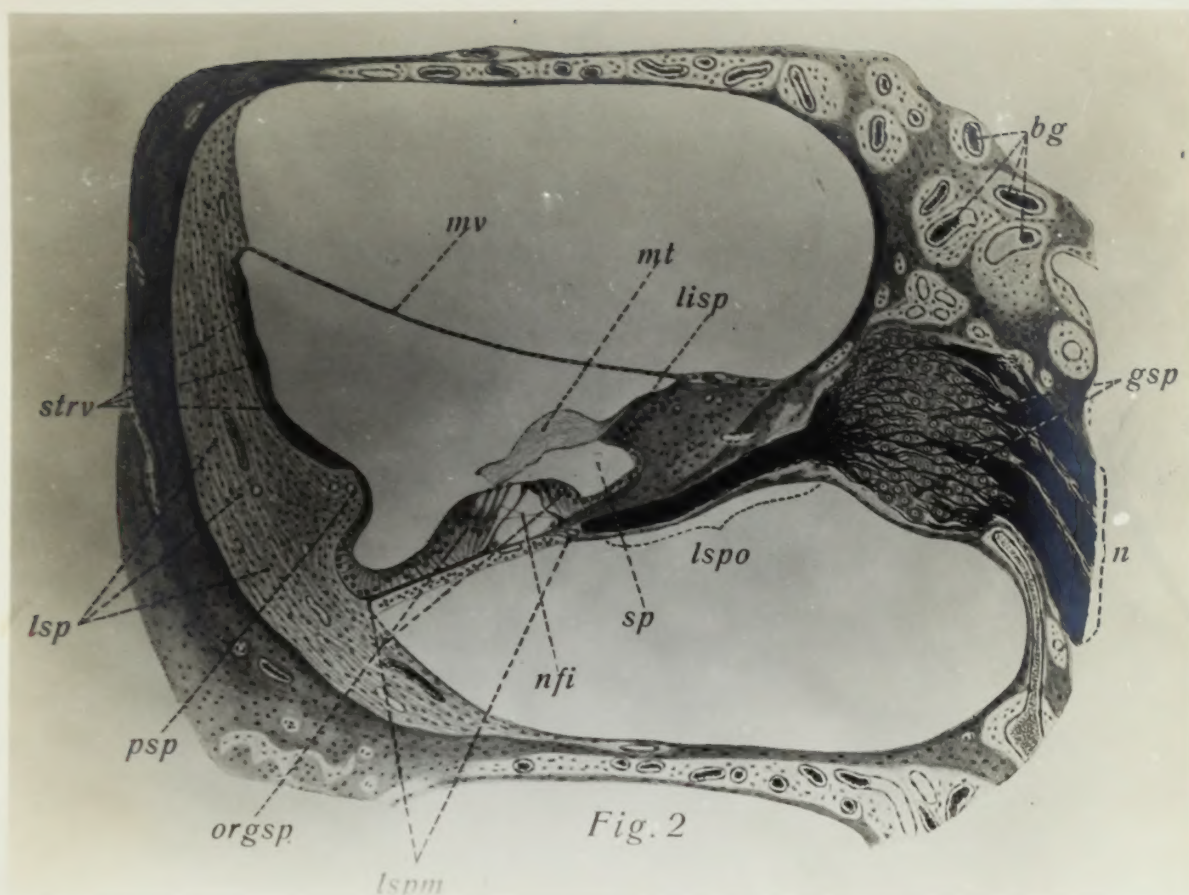
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- strv - - Stria vascularis
- lsp- - - Spiral ligament
- psp- - - Spiral prominence
- orgsp- - Organ of Corti
- mv - - - Reissner's membrane
- mt - - - Tectorial membrane
- lisp - - Limbus
- nfi- - - Nerve fibers
- sp - - - Internal spiral sulcus
- lspo- - Osseous spiral lamina
- lspm - - Basilar membrane
- bg - - - Blood vessels
- gsp- - - Spiral ganglion cells
- n- - - - Twig of cochlear nerve

PLATE II

16

n- - - - - Twigs of cochlear nerve
 cap- - - - - Spiral ganglion cells
 bc - - - - - Blood vessels
 lam- - - - - Basilar membrane
 tap- - - - - Ossicles spiral lamina
 ap - - - - - Internal spiral sulcus
 nfi- - - - - Nerve fibers
 lam- - - - - Limbus
 m- - - - - Tectorial membrane
 my - - - - - Reissner's membrane
 organ- - - - - Organ of Corti
 pap- - - - - Spiral prominence
 pap- - - - - Spiral ligament
 sty- - - - - Stylic vasculature

of the two in unison, as the structure seems very rigid. The cells, being inclined and having their bottoms somewhat separated, a triangular shaped opening is found between them. The cells themselves are known as Corti's Rods, the two together are Corti's Arch, and the triangular open space is Corti's Tunnel. The plates show minute fibers crossing the tunnel; these are nerve fibers. Discussions concerning them will be given in the next section.

Inward from the tunnel lies a single row of cells which are also ciliated. These are abutted against the inner rods or pillars and also receive nerve fibrils. The bottoms of these cells do not extend down to end on the basilar membrane but instead reach only partly down the inner pillars and are directly supported by these. From a structural consideration of the organ as a whole, it thus appears that any motion communicated to it by a motion of the basilar membrane must cause the motion of the structure as a unit, with very little if any motion of parts independently.

Over the entire collection of ciliated cells there extends a very delicate, meshlike membrane which appears as a sheath to enclose this portion of the structure. This is the reticular membrane. The tufts of cilia pass through openings in the membrane, which is apparently disposed so that it will not hamper or curtail any motion which may be required of the auditory hairs.

The external extremity of the spiral lamina does not end smoothly but shows, in profile, a concavity with the lower side extending further out from the modiolus than the superior extremity. As the basilar membrane is attached to this lower point there is a recessed portion lying just inside of the Organ of Corti within the scala media. The concave end of the

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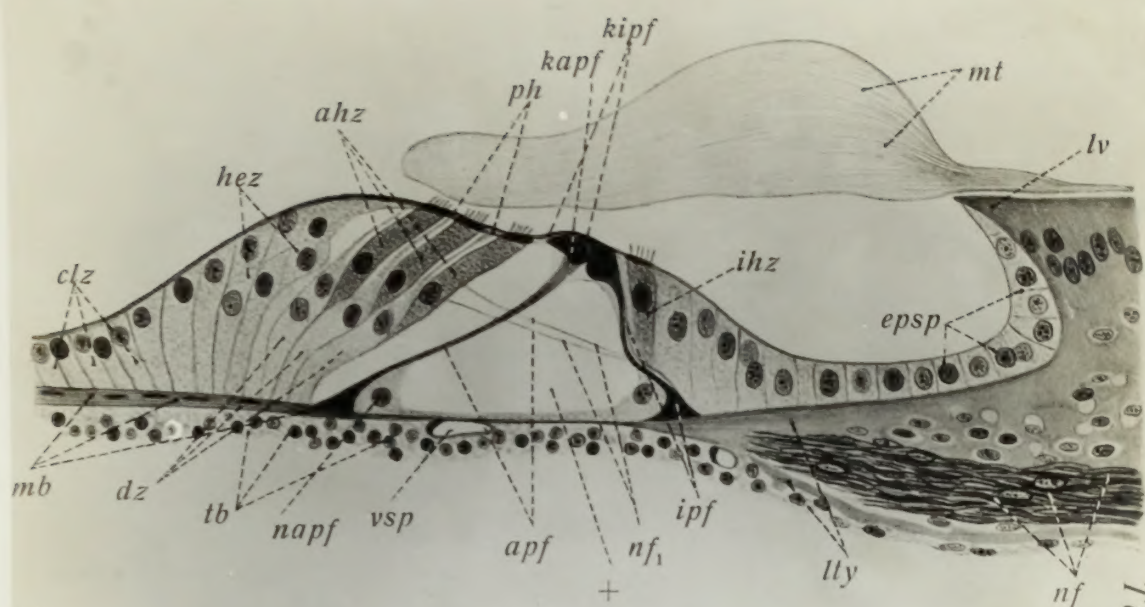


Fig. 3

Tab. 85

- clz - - Lining cells
- hez - - Supporting cells
- ahz - - Outer hair cells
- ph - - Reticulated membrane
- kapf - - Head plate of Corti's rod (outer)
- kipf - - Head plate of Corti's rod (inner)
- mt - - Tectorial membrane
- lv - - Limbus
- ihz - - Inner hair cells
- epsp - - Epithelial cells
- mb - - Basilar membrane
- dz - - Deiter's rods
- tb - - Lining cells
- napf - - Foot plate of Corti's rod
- vsp - - Vascular vessel
- apf - - Outer rod of Corti
- + - - Tunnel of Corti
- nf₁ - - Nerve fibers
- ipf - - Inner rod of Corti
- lty - - Lower edge of spiral lamina
- nf - - Bundle of nerve fibers

osseous lamina is known as the Tooth of Haschke or the lamina denticulata. A layer of epithelial cells lines this sickle-shaped ending and extends outward to the place of the inner hair cells. This leaves a valley between the end of the osseous shelf and the Organ of Corti, which is the internal spiral sulcus.

A membrane extends from the upper side of the spiral lamina across the internal sulcus and terminates just beyond the region of the outer hair cells. This membrane is rather thin while in contact with the limbus but thickens as it reaches out across the sulcus to obtain its maximum depth just before the level of the inner hair cells is reached. Following this the thickness again decreases rather uniformly until the termination. This, the tectorial membrane, was erroneously described for many years following its discovery. It was not until early in the present century that an American anatomist showed that the position of the membrane as previously described was an artifact which was introduced due to the histological technique. It was found that in the fixing of the preparation the specimen was immersed in a strong dehydrating agent which caused a shrinkage to take place, with the resulting curl obtained in the membrane. The forces induced by this were sufficiently great to rip the membrane loose from its enmeshing with the cilia and cause it to assume the superior position and thus look as if in the living condition it merely floated above the Organ of Corti. If care be taken to allow no strong dehydrating agents to act on the specimen, the resulting preparation shows that the inferior of the membrane is in actual contact with the superior aspect of Corti's Organ while the cilia are firmly enmeshed with the tectoria. This is important when the consideration of the function is under investigation. It also brings out another important

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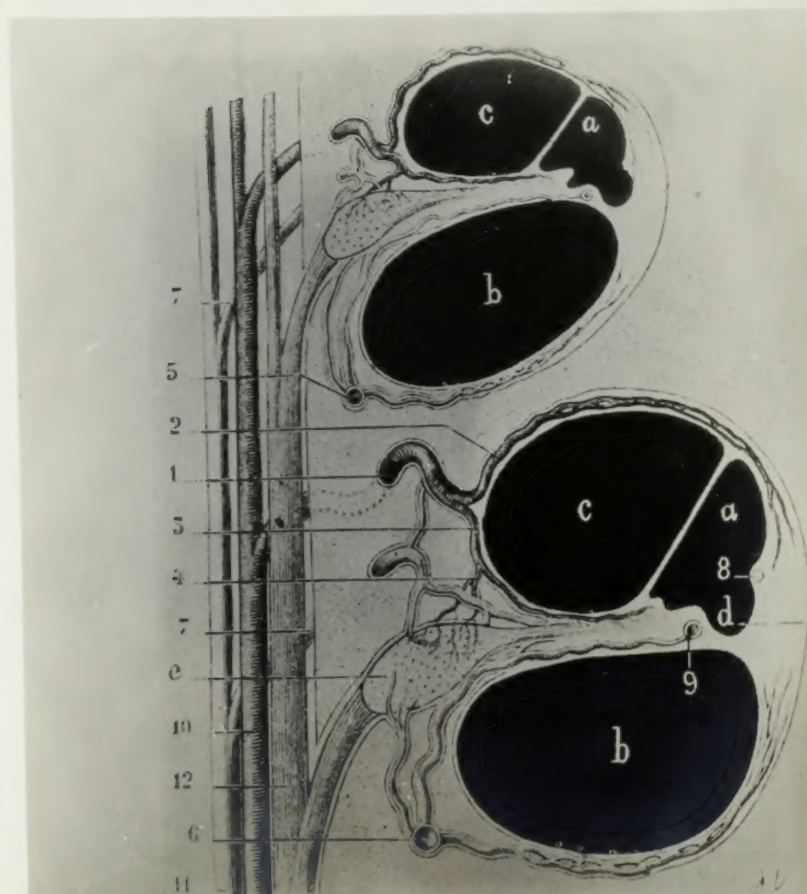


Fig 4.

A, Arteries and veins remain distinct throughout. 1, Spiral artery. 2, Its anterior branches. 3, Middle branches. 4, Posterior branches. 5, Superior spiral vein. 6, Inferior spiral vein. 7, Vein of the lamina spiralis. 8, Prominent vessel. 9, Spiral vessel. 10, Internal auditory artery. 11, Internal auditory vein. 12, Cochlear nerve. *a*, Scala media or endolymph canal; *b*, Scala tympani; *c*, Scala vestibuli, perilymph canals (Testut).

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point. If the theory of the method of function is to be obtained by a process of extrapolation from the appearance of the organ and its structural details, it is extremely important that no artifacts be introduced by methods of handling or methods of preparation. It seems permissible to ask: How many of the facts on which the theory is founded at the present time are free from artifact?

On the outside wall of the ductus cochlearis, which is also the osseous wall of the bony cochlea, is a structure, the stria vascularis, which should be mentioned. It receives a very copious vascular supply and contains pigments in varying amounts. This stria lies slightly superior to the point of attachment of the basement membrane to the spiral ligament. From the structure this would be assigned a secretory function; the exact function is not known.

The entire system of canals is filled with liquid which is differentiated into two kinds since there are two entirely separate systems. The liquid filling the bony canals is the perilymph and extends to the vestibular portion of the system as well as to the cochlea. This liquid is in communication with the subarachnoid space of the brain along the sheath of the Nervus Acusticus. The liquid filling the membranous labyrinth is the endolymph. The cochlear and vestibular portions are continuous through the canal reuniens while the entire system contacts the subdural lymph spaces by way of the ductus endolymphaticus; ending in the enlargement called the saccus endolymphaticus, and situated on the posterior part of the petrous portion of the temporal bone. The saccus is a blind pouch but may pass the liquid by a process of filtration or permeation. This is an interesting point and is worthy of experiment.

point. If the theory of the method of function is to be obtained by a process of extrapolation from the appearance of the organ and its structural details, it is extremely important that no artificial be introduced by methods of handling or methods of preparation. It seems particularly so now many of the facts on which the theory is founded at the present time are from artificial.

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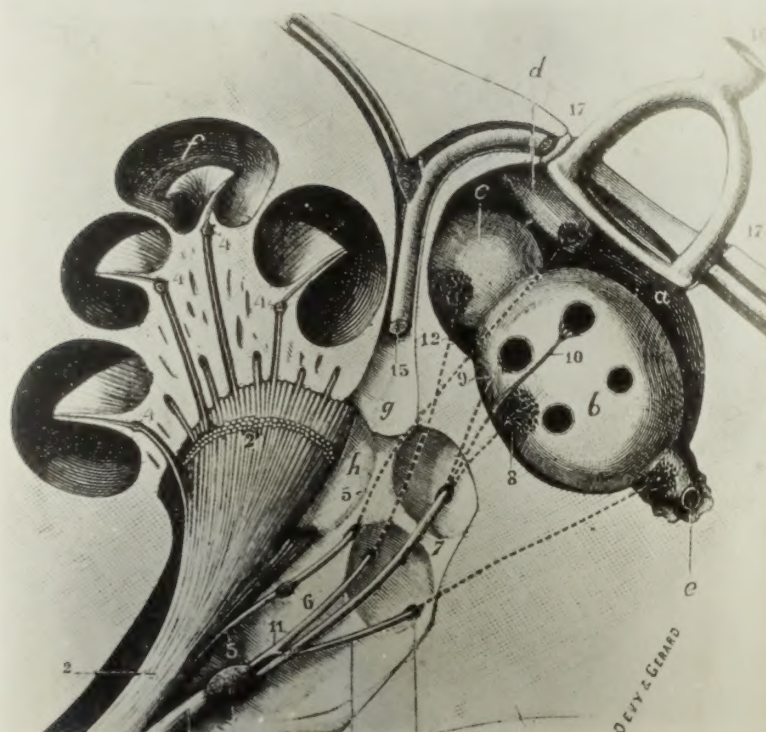
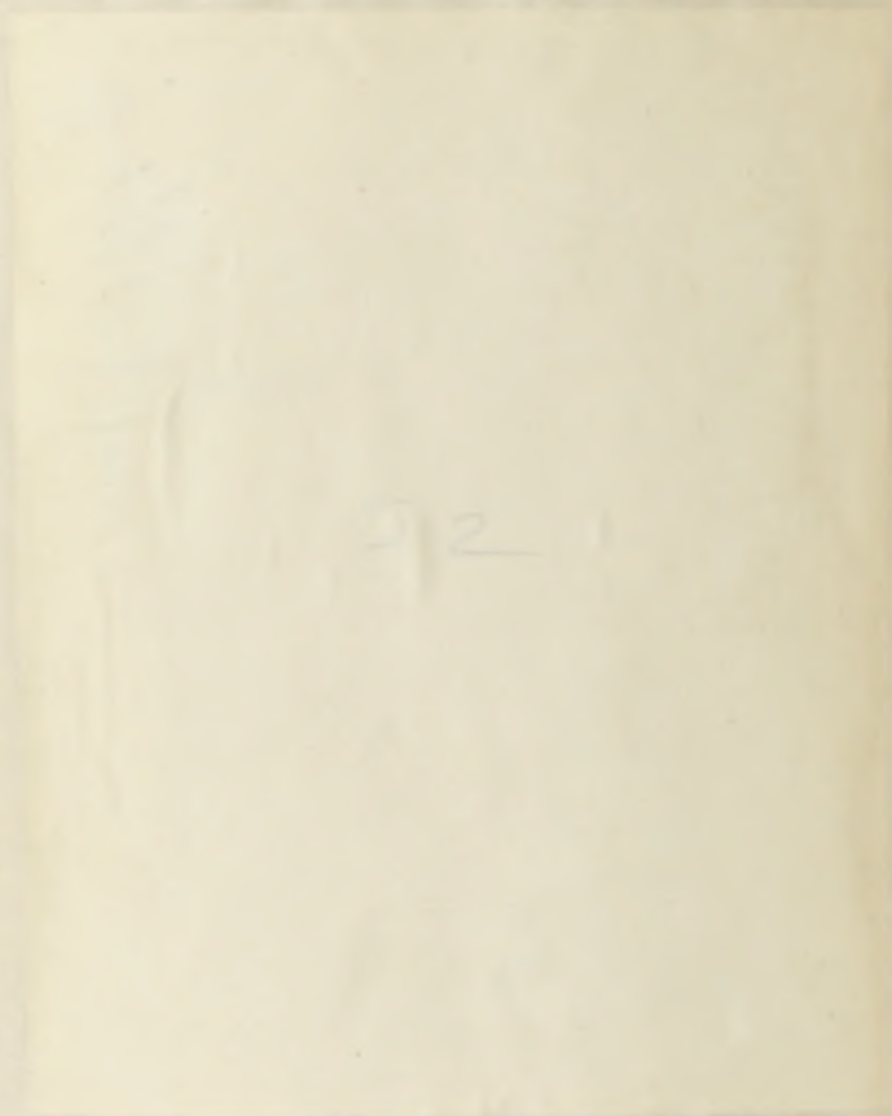


Fig. 5 A

Fig. 5 A.—Sketch showing the distribution of auditory nerves. a, Vestibule, with b, Utricle. c, Saccula. d, Beginning part of cochlear canal. e, Ampulla of posterior semicircular canal. f, Cochlea. g, Aqueductus fallopii. h, Bottom of internal auditive tube with four small fossae. 2, Cochlear branch, with 2', Superficial section. 3, Vestibular branch. 4, Corti's ganglion. 5, Small branch from the vestibular part of the cochlear canal. 6, Boettcher's ganglion. 7, Superior vestibular nerve. 8, Utricular nerve. 9, Superior ampullar nerve. 10, External ampullar nerve. 11, Interior vestibular nerve. 12, Saccular nerve. 15, Facial nerve. 16, Stapes on the fenestra ovalis. 17, Tympanum (Testut).



V. 24.13

Summarizing what has been explained in detail in the preceding pages it may be said. The bony cochlea is twisted to form two and one-half turns about the modiolus. The cross section of this canal decreases as it goes from base to apex. The lumen of the canal is divided into three scalae. The liquid filling the upper and lower scalae are in communication through the helicotrema in the apex and also with the subarachnoid space of the brain. Lying between the two is the scala media which contains the Organ of Corti. This is separated from the scala vestibuli by Reissner's membrane and from the scala tympani by the basilar membrane. It is blind at either end but communicates with the sacculle and then the subdural lymph space, and is filled with the endolymphatic fluid. The scala tympani is in functional communication with the tympanum through the round window which is closed by the secondary tympanic membrane. The scala vestibuli opens into the vestibule which houses the oval window and hence receives impulses produced by motions of the footplate of the stapes. Any communication to the ductus cochlearis or an organ housed by it must come either via the oval window or the round window.

SECTION 4

NERVE TRACT

The nerve which carries the impression of sound perceived to the brain is the eighth cranial or acoustic nerve. In reality only a portion of this nerve serves the hearing sense since a portion of the labyrinth is allocated the function of bodily equilibrium. These two portions of the nerve arise in neighboring sets of nuclei located in the brain stem. They then join to form the composite nerve and continue together until after the internal auditory meatus is entered. Here a separation ensues, the two portions each

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going to innervate their particular end organs.

The modiolus is traversed by numerous channels to permit the passage of the groups of fibers. Lying near the external border of this long axis is an oval shaped canal which is found to contain the cell bodies of these fibers. These cells located in the oval housing of Rosenthal's canal are among the few occurring in the body which retain their bipolar characteristics after maturation. From this layer of ganglionic cells the shorter peripheral processes radiate outward in groups. The course of these fibers is through openings provided in the osseous spiral lamina so that they eventually come to the vicinity of the inner edge of the Organ of Corti. Here a fiber is given off which ascends to end around the cell body of the inner hair cell thus giving it a functional neural connection. The others continue outward and cross through the Tunnel of Corti as free fibers swinging in liquid and then dive into the opposite wall of the tunnel to continue outward to the region of the outer hair cells. They then give off a terminal arborization which furnishes a neural connection to the outer hair cells.

The central process is much longer than is the peripheral. As these fibers leave the Canal of Rosenthal in small groups they are joined by groups of fibers coming from higher up in the modiolus and then swing toward the basal part where they meet the vestibular twig before issuing from the internal auditory meatus into the cranial cavity proper. The nerve then crosses toward the brain stem which it enters near the rostral extremity of the medulla oblongata and ends about the appropriate nuclei. The primary acoustic nuclei are divided into two masses, the dorsal cochlear nucleus and the ventral cochlear nucleus, at about the level where the restiform body turns dorsally into the cerebellum.

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The cochlear fibers are in synaptic connection with a second set of

fibers which continue the course toward the higher centers. The fibers from the ventral nucleus cross the median plane in the pontine region of the brain stem in the trapezoid body where collaterals may be given off to end in the nucleus of this body or of the superior olive; or fibers arising from these nuclei may join the auditory tract. Crossed to the contralateral side, the path then turns rostrally and runs as a definite, compact bundle known as the lateral lemniscus or lateral fillet. In the rostral portion of the pons collaterals may be given off to the nucleus of the lateral lemniscus. Fibers which arise in the dorsal cochlear nucleus sweep over the dorsal aspect of the restiform body and thus the floor of the fourth ventricle in the striae medullaris acousticae. At about the median plane a decussation ensues and the fibers then join the adjacent lateral fillet and run with it to the higher centers. Somewhere in the system are fibers which are not crossed since clinical experience leads to the belief that there is a bilateral cortical representation of either ear. Where the uncrossed fibers come from is not known but it is supposed that they run upward with the pathways just discussed.

As the lateral lemniscus reaches the level of the mesencephalon a part of the fibers terminate in a protuberance known as the inferior colliculus. Branches and direct fibers also extend to the medial geniculate body which serves as a way-station for the auditory pathway to the cortex. It is supposed that the inferior colliculi serve as centers for reflex arcs, the exteroceptive branch of which are auditory signals.

This is rather a sketchy view of the neural pathway for auditory events but it represents what is known up to within the past few years. In 1933 a very important contribution to this subject was made by Lorente de No.*

* Lorente de No, R.: Laryngoscope 43, 1, 1933.

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No attempt will be made to review his work in detail but his conclusions will be quoted verbatim as they sum up his findings extremely forcibly and compactly. They are:

- " (1). An anatomical proof of the projection of the ganglion of Corti in the primary acoustic nucleus is given.
- (2). Cochlear fibers, shortly after their arrival in the medulla, divide into ascending and descending branches; the points of division of the fibers, if projected on a longitudinal plane, form an arc that is the caudal boundary of the ventral nucleus. This line is a projection of the uncoiled Corti ganglion in such a way that the highest point of it corresponds to the apical and the lowest to the basal part of the ganglion.
- (3). Owing to the different kinds of endings, the cochlea is not projected point-like in the primary acoustic nucleus because each point of the cochlea is represented several times.
- (4). An embryological explanation of the twisted course of the cochlear nerve is given."

In a second contribution^{*} his conclusions are as follows:

- (1). The primary acoustic nucleus has been studied in preparations stained with selective methods.
- (2). Each cochlear fiber gives branches to no less than 13 regions of specific structure, where more than 50 different types of cells have been found. Each cochlear fiber establishes connections with hundreds of cells. Endogenous association fibers connect reciprocally the different parts of the primary nuclei.
- (3). The structure of each of the thirteen regions has been sum-

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point of its course corresponds to the apex and the lowest to the base

part of the nucleus.

(3). Unlike the different kinds of endings, the nucleus is not

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the different parts of the primary nucleus.

(3). The structure of each of the fifteen regions has been ana-

"arily described.

(4). An attempt has been made to determine the physiological significance of the anatomical structures.

(5). The main conclusion is that the primary nucleus cannot be considered as "dead beat" synapses but rather as selective synapses which transmit impulses according to (a) the afferent impulses, (b) the impulses set up in the nuclei themselves by the cells with short axis cylinders, (c) the impulses arriving from the upper nuclei via the centrifugal fibers.

(6). The necessity for carrying out a complete anatomical analysis of the central nuclei, in order to have a sound foundation for physiological research is stressed. Today no reflex arc and no part of the nervous system is sufficiently known."

The last of these gives summarily the state in which one finds oneself in the field of physiological acoustics. It seems essential that our knowledge be extended so that the anatomy be known accurately and possible neural pathways, along with the limitations of each, may be discussed with accuracy. This rather changes the simple viewpoint of the system as outlined in the first part of this section but it points out that the simplicity previously attained was due merely to the lack of application of sufficiently refined technique.

This completes the necessary anatomical background and one may now discuss the function with detail regarding the logical limitations of the organ or part by its structural detail. The entire discussion has been as brief as possible but it is felt that sufficient familiarity has been cultivated to serve the purpose at hand.

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In discussing the physiology of the ear it is necessary to do more than merely state how the organ may function. It will be necessary to deal with the problem from a physical or analytical standpoint in places. It seems logical that any method of function which the organ may really have is not in contradiction to the laws of physics. Care must be taken in applying any of these laws to be certain that they can apply. To date, articles appearing in the literature which deal with the theory of hearing may be classified in two groups generally (of course, there are exceptions). One of these groups is satisfied to obtain a theory which fits in with their biological point of view and absolutely disregard any physical limitations which the problem contains; while the other group is satisfied to write down analytical expressions which will give the desired functional problem without due regard to the biological possibility of the ability to perform this function.

PART II

These are the two extreme positions which are taken and may be traced directly to the background and training of those dealing with the subject. To the medical man the formulation of the functional equation is foreign and has little or no meaning. To the physicist the limitations of function imposed by the general laws of nature are foreign. Thus there arise two widely divergent views, both of which may contain elements of the truth but which need to be united by some author who has sufficient fundamental knowledge of the two fields. In this way much more productive results should be obtained and the benefits should accrue to both the fields involved.

Before turning to the discussion of the organ as it is to be analyzed in this paper, a quotation from a German investigator will be cited. This quotation summarizes his conception of the mechanism of the auditory sensation and the order of events of each section of the chain of events.

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Budde* writes as follows: "Das Trommelfell nimmt die Luftwellen auf, überträgt sie durch Hammer und Amboss auf die Steigbügel und mittels der Fussplatte des Steigbügels durch das ovale Fenster auf die Perilymphe der Scala vestibuli von da auf den Ductus cochlearis und von diesem auf die Scala tympani, wo sie an das elastisch verschlossene runde Fenster anprallen und von diesem zurück-geworfen werden. Dauerende Druckunter-schiede zwischen dem Inhalt der beiden Skalen werden durch das Helikotrema unmöglich gemacht; periodische Schwingungen von nicht übermässiger Dauer affizieren wesentlich den Inhalt und die seitlichen Begrenzungen des Ductus cochlearis, da das Helikotrema zu klein ist, um einen erheblichen schnellen Durchgang von energie zuzulassen. Die Schwingungszahlen derjenigen Wellen, die zu deutlichen, unter sich leicht vergleichbaren Tonempfindungen Veranlassung geben, liegen etwa zwischen 30 und 9000; die Entsprechenden Wellen haben also in der Luft eine Länge, die zwischen 10 m. und 4 cm. liegt; im Labyrinthwasser ist diese Wellenlängen noch viermal grösser. Die uns beschäftigenden Wellenlängen sind also so gross, dass die Dimensionen der Gehörknöchelchen, der Flüssigkeitsmenge in der Schnecke und besonders der im Ductus cochlearis enthaltenen Organe gegen sie kaum im Betracht kommen. Daraus folgt, dass mit erheblichen Phasenunterschieden zwischen den ver-schiedenen Partien eines und derselben Gehörknöchelchens oder zwischen verschiedenen Stellen des Labyrinthwassers nicht zu rechnen ist; jeder Knochen schwingt als Ganzes, ebenso das Labyrinthwasser bzw. dessen "Strömungsfäden".

This summarizes his viewpoint concerning the action. Nothing is said in his discussion concerning the anatomy except a statement in the first paragraph to the effect that in the ensuing treatment the anatomy of the ear is assumed to be known. His treatment is not exceptionally analytical but

*Budde - Mathematischen Theorie usw. S. 168.

it is evident that all views are based on the physical analogy to a vibrating system.

Later in his article he states*: "Im Anfang setzte man die Annahme, dass die Basilarmembran dasjenige Organ sei, welches die Auftreffenden Schallschwingungen primär durch Mitschwingungen aufnimmt, mit der Prinzip der Spezifischen Sinnesenergien im Verbindung durch die Hypothese: J e d e B a s i l a r f a s e r g i b t w e n n s i e s c h w i n g t V e r a n l a s s u n g z u r E n t s t e h u n g e i n e r T o n e m p f i n d u n g v o n e n t s p r e c h e n d e r H ö h e."

With the above as a short introduction, attention is now directed to an analysis of the process involved in the act of hearing.

If a body has a position of equilibrium and is subjected to the condition that a displacement from equilibrium results in a force opposing the movement which is proportional to the distance from the resting place, the necessary condition for an oscillatory motion is established. Formulated in equations, this becomes:

$$(1) \quad F' = -kx$$

F is the restoring force, k is a constant and x the displacement. But now it is possible to apply Newton's second law of motion which says that:

$$(2a) \quad F' = ma = m d^2x/dt^2$$

or in the case at hand:

$$(2b) \quad F' = -kx = m d^2x/dt^2$$

Rearranging this gives the form:

$$(2c) \quad d^2x/dt^2 + \frac{k}{m}x = 0$$

This equation may be solved by inspection as one sees immediately that it is satisfied by:

* Ibid: Seite 169.

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dass die Resonanzkurven des menschlichen Organes sei, zwischen die Aufrechterhalten

der Gleichgewichtspositionen durch kleine Störungen ausbleibt, mit der Prinzip

der spezifischen Sinnesenergie in Verbindung durch die Hypothese: Und

Resonanzkurven gibt es dann als solche, die sich

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tion that a displacement from equilibrium results in a force opposing the

movement which is proportional to the distance from the resting place, the

necessary condition for an oscillatory motion is established. Formulated

in equations, this becomes:

$$F' = -KX \quad (1)$$

F' is the restoring force, K is a constant and X the displacement. But now

it is possible to apply Newton's second law of motion which says that:

$$F' = ma = m \frac{d^2X}{dt^2} \quad (2a)$$

or in the case at hand:

$$F' = -KX = m \frac{d^2X}{dt^2} \quad (2b)$$

Rearranging this gives the form:

$$\frac{d^2X}{dt^2} + \frac{K}{m}X = 0 \quad (2c)$$

This equation may be solved by inspection as one sees immediately that it is

satisfied by:

* Ibid; Seite 155.

$$(3) \quad \chi = A f(t) + d$$

or as a particular case of this general solution:

$$(3a) \quad \chi = A \sin 2\pi \sqrt{\frac{k}{m}} t + a_1 = A \cos 2\pi \sqrt{\frac{k}{m}} t + a_2$$

In this expression A is the maximum displacement and a_1 or a_2 the phase angle. Both of these are needed to give an arbitrary solution since the original equation was of the second order. This is a simple harmonic motion and is the most simple form which a motion that recurs periodically may take. No mention has been made of frictional forces or damping effects as they would only complicate the problem and, for the purpose under consideration, add nothing of value.

Suppose, for definiteness, that the body which is performing the above discussed simple harmonic motion is a tuning fork which has only one tine. The motion of this tine will excite the particles of the surrounding medium which is supposed to be air. These particles will vibrate in rhythm with the driving force of the fork and will transmit their motion to the neighboring particles. Thus there will be a spreading out of the disturbance and at some later time a point in space will exist which has not yet been excited but which, if looked at very shortly afterward, will have been excited. Thus there exists a point, which is a function of the time, which separates the undisturbed medium from the disturbed. Since all particles in the disturbed medium are in a definite phase with respect to the exciter, the motion of these particles will be periodic in time and since they vary as one moves through the medium in the space, they will also be periodic in space and hence the phenomenon will be one of waves. If the medium is isotropic, homogeneous, and statistically at rest, the wave will spread with the same velocity and amplitude in all directions. Thus the point spoken of above will become a spherical surface and is known as the wave front.

$$X = A \sin \left(\frac{2\pi}{\lambda} x + \frac{2\pi}{T} t + \alpha \right) \quad (3)$$

or as a particular case of this general solution:

$$X = A \sin \left(\frac{2\pi}{\lambda} x + \frac{2\pi}{T} t + \alpha \right) = A \cos \left(\frac{2\pi}{\lambda} x + \frac{2\pi}{T} t + \alpha' \right) \quad (3a)$$

In this expression A is the maximum displacement and α' or α the phase angle. Both of these are needed to give an arbitrary solution since the original equation was of the second order. This is a simple harmonic motion and is the most simple form which a motion that repeats periodically may take. No mention has been made of frictional forces or damping effects as they would only complicate the problem and, for the purpose under consideration, add nothing of value.

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In order to treat with this problem analytically the above simple function must be modified to have an argument dependent on both the time and the distance from the source. Thus the general solution would be of the form:

$$(4) \quad \phi = F(t - r/c) + G(t + r/c)$$

The first of these would represent a wave expanding away from the source while the second would picture one converging toward it. If an observer were to travel along with the wave he would always sense it in the same phase. The speed with which he must travel is just the quantity c in equation (4) and hence is termed the velocity of the wave in the medium. If now the observer is fixed in space and watches the disturbance of the medium he will find that after a certain time T the events begin to repeat themselves. Furthermore, he will find that separated in space by a certain distance L is a repetition of conditions. Having observed these quantities he finds that the following relation is true:

$$(5) \quad c = L/T \quad \text{or} \quad cT = L$$

If he now considers the vibrating source and finds that it produces n complete cycles in a unit of time, that is, has a frequency n , the equation (5) may also be written in the form:

$$(6) \quad c = \frac{L}{T} = nL$$

Experience shows that the speed of propagation, c , is always the same for a given medium under a given set of conditions. Thus, the observer realizes that he can completely describe the process by merely defining the medium and either the frequency of vibration of the source or the wave length L of the disturbance given out by it.

It is found that if this frequency lies within certain limits and the observer places himself within the field of the disturbance he becomes conscious of a sensation which is known as hearing, provided the energy in the

in order to treat this problem mathematically the above simple function must be modified to have an argument dependent on both the time and the distance from the source. Thus the general solution would be of the form:

$$(\#) \quad \psi = F(t - \sqrt{c}) + G(t + \sqrt{c})$$

The first of these would represent a wave expanding away from the source while the second would picture one converging toward it. If an observer were to travel along with the wave he would always sense it in the same phase. The speed with which he must travel is just the quantity c in equation (#) and hence is termed the velocity of the wave in the medium. If now the observer is fixed in space and watches the disturbance of the medium he will find that after a certain time T the events begin to repeat themselves. Furthermore, he will find that separated in space by a certain distance L is a repetition of conditions. Having observed these quantities he finds that the following relation is true:

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It is found that if this frequency lies within certain limits and the observer places himself within the field of the disturbance he becomes conscious of a sensation which is known as hearing, provided the energy in the

sound waves is sufficient. These waves are a stimulus for this sense and it is found that different frequencies produce different sensations and that the ear can also report difference in the intensity.

The sound waves travel down the external auditory meatus until they reach the inner end where they impinge upon the tympanic membrane. When the pressure in the wave is greater than the normal atmospheric pressure the drum-skin is depressed into the tympanum while if it be less the membrane is pulled toward the outer side, or rather displaced outward, due to the normal pressure existing within the tympanum. Thus the tympanic membrane is excited into oscillations homorhythmic with the motion of the air in the canal.

It will be recalled that the manubrium is firmly attached to the drum-skin, while the head articulates with the incus which in turn is strongly attached to the stapes. Thus the motion of the membrane is transmitted by the ossicles and communicated by the stapedian foot-plate to the cochlear liquid. It will be well to consider the necessity of this bony system as one might logically ask: why can not the sonorous waves of the air impinge on a membrane so placed that the cochlear fluid is set in vibration directly? The answer is obtained by an analysis of the system from a mechanical viewpoint.

The overall leverage of the chain results in the displacement at the drum-skin being reduced when referred to the footplate and consequently the thrust delivered is less extensive and more powerful. A further mechanical advantage is gained by the reduction in area between the first and last member, this reduction amounting to approximately 20 to 1. All in all the mechanical advantage gained amounts to between 30 and 60. The nature of the motion of the fluid is not known, but as an approximation let it be considered that compressional waves are set up in it and that its density is

sound waves is sufficient. These waves are a stimulus for this sense and it is found that different frequencies produce different sensations and that the ear can also report difference in the intensity.

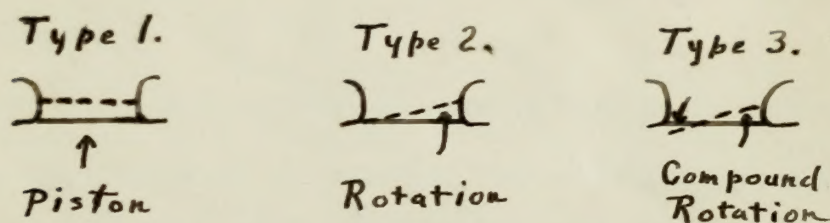
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The overall leverage of the chain results in the displacement at the drum-skin being reduced when referred to the footplate and consequently the thrust delivered is less extensive and more powerful. A further mechanical advantage is gained by the reduction in area between the first and last members, this reduction amounting to approximately 80 to 1. All in all the mechanical advantage gained amounts to between 30 and 80. The nature of the motion of the fluid is not known, but as an approximation let it be considered that compressional waves are set up in it and that its density is

approximately unity. Now, the impedance of the air, from which the power is obtained, to that of the liquid, to which the power is delivered, is as 43 to 144,000. For maximum power transport across the discontinuity it is necessary that these impedances be matched and the transformer ratio necessary to effect the matching will be as the square root of the ratio of impedances. Thus, from the values given, the desired value is about 58 which is of the same order of magnitude as the results obtained for the mechanical system*. It seems apparent that nature has provided the organ with a system such that the optimum power may be obtained.

A further peculiarity should be noted here concerning the motion of the stapes. From many of the books on the subject one would obtain the impression that the foot-plate merely dives into the oval window in a piston-like motion. This is not the case. Instead, the motion is a rotation of the bone about a fixed axis. Some consider the axis to be the posterior margin, while others consider it to be the junction of the posterior and middle thirds. The following figure compares these three types of motion.



Types of Motion

Figure 2

The air wave which was acting as the motivating source of the drum-skin is represented by the equation following, since the complex form of (4) re-

*Values used are from H. Fletcher, Speech and Hearing.

approximately unity. Now, the impedance of the air, from which the power is obtained, is that of the liquid, to which the power is delivered, is as 43 to 145,000. For maximum power transfer across the discontinuity it is necessary to try that these impedances be matched and the transformer ratio necessary to effect the matching will be as the square root of the ratio of impedances. Thus, from the values given, the desired value is about 20 which is of the same order of magnitude as the results obtained for the mechanical system. It seems apparent that nature has provided the organ with a system such that the optimum power may be obtained.

A further peculiarity should be noted with regarding the action of the organ. From many of the books on this subject one would obtain the impression that the four-glaze cavity dives into the oval window in a piston-like motion. This is not the case. Instead, the motion is a rotation of the bone about a fixed axis. Does consider the axis to be the posterior margin, while others consider it to be the junction of the posterior and middle thirds. The following figure compares these two types of motion.

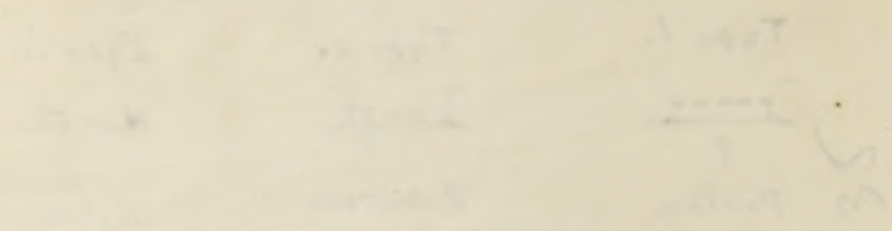


Figure 2

The air wave which was acting as the motivating source of the drum-like is represented by the equation following, since the complex form of (4) is not used and are from H. Fletcher, Speech and Hearing.

duces to this simple form if considerations concern only a fixed point in space.

$$(7) \quad y = B \sin 2\pi n t$$

where y represents the excess density, the displacement or the velocity - provided only that the system be consistent, B is the maximum value of y , and n is the linear frequency. The same expression is valid for any point on the membrane except that B will vary from point to point of the surface depending on the value of, say, r , the distance from the umbo, and will be a constant for r . Likewise the equation will apply to any point of the ossicles, B being chosen to satisfy the boundary conditions applicable to the point. It follows then, that the compressional wave in the inner ear fluid will be represented by the same type of expression; but since the maximum displacement has been reduced by a fixed amount, this may be written with a new constant, as:

$$(8) \quad y_c = C \sin 2\pi n t$$

It is obvious that the cosine of the same argument will satisfy the equations if substituted for the sine in all of the above relations. Thus a simple harmonic wave in the air sets up a homorhythmic compressional wave in the cochlear fluid.

The above discussion has tacitly assumed throughout that the middle ear lever system has reproduced the exciting tone with absolute fidelity. Some investigators disapprove this, saying instead that the tympanic system introduces harmonic distortions which impress subjective frequencies on the inner ear which are not present in the exciting tone. This may be considered easily from the analytical viewpoint.

Assume the same exciting wave of frequency n . The corresponding quantity for the inner ear must now be obtained from a generalization of the

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$$(8) \quad y_0 = C \sin 2\pi n t$$

It is obvious that the cosine of the same argument will satisfy the same conditions if substituted for the sine in all of the above relations. Thus a single harmonic wave in the air sets up a corresponding compressional wave in the cochlear fluid.

The above discussion has tacitly assumed throughout that the middle ear lever system has reproduced the exciting force with absolute fidelity. Some investigators disapprove this, saying instead that the tympanic system introduces harmonic distortions which increase subjective frequencies on the inner ear which are not present in the exciting tone. This may be considered easily from the analytical viewpoint.

Assume the same exciting wave of frequency n . The corresponding output for the inner ear may now be obtained from a generalization of the

simple solution. Consider for definiteness the case of displacement. The air displacement is, as usual, given by the form (7) but the inner ear fluid displacement will be given by:

$$(9) \quad y_c = F(y) = a_0 + a_1 y + a_2 y^2 + \dots$$

Since y is given by (7) this may be written as a power series for the sine, or cosine, of y and (9) becomes:

$$(10) \quad y_c = y_0 + y_1 \left\{ \frac{\sin}{\cos} \right\} 2\pi n t + y_2 \left\{ \frac{\sin^2}{\cos^2} \right\} 2\pi n t + \dots$$

Expanding the powers of the trigonometric functions and using the cosine form, since the expansion of this is more straightforward, the first few terms are:

$$(11) \quad \begin{aligned} \cos^2 2\pi n t &= \frac{1}{2} \cos 4\pi n t + \frac{1}{2} \\ \cos^3 2\pi n t &= \frac{1}{4} \cos 6\pi n t + \frac{3}{4} \cos 2\pi n t \\ \cos^4 2\pi n t &= \frac{1}{8} \cos 8\pi n t + \frac{1}{2} \cos 4\pi n t + \frac{3}{8} \end{aligned}$$

Putting these values into (10) gives:

$$(12) \quad y_c = b_0 + b_1 \cos 2\pi n t + b_2 \cos 4\pi n t + b_3 \cos 6\pi n t$$

This means, then, that a simple harmonic wave in the air induces a complete harmonic spectrum on the internal ear.

All proofs of this rest on purely subjective experimental procedures and may be questioned as to their validity. It would be very much worth while to try this by objective methods in order to determine its truthfulness. It seems logical that at sufficiently great intensities it might be true, due to an overloading effect, but at low intensities it is difficult to see why it should hold. At any event, in the succeeding discussing it will be assumed that the transmission is linear, that is, that Hooke's Law holds, and in the above expansion (12) all terms except the first one depending on t

single solution. Consider for definiteness the case of displacement. The air displacement is, as usual, given by the form (7) but the inner ear fluid displacement will be given by:

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that the transduction is linear, that is, that Bekesy's law holds, and in

the above expansion (12) all terms except the first one depending on t

disappear. Thus the compressional wave in the cochlea is represented by (8).

This wave will be transmitted through the cochlea in some direction and will eventually impinge upon the elastic membrane covering the round window. It is logical to inquire into the phase difference of the displacements at the oval and round windows. The value for the speed of sound in air is taken as 340 m./sec. (18° C.); thus, for frequencies 20 and 20,000 cycles per second the wave lengths will be 17 M. and 1.7 cm. respectively. The speed in the liquid, assumed as water, at 37° Cent. is about 1530 m/sec. and thus the wave length will be 4.5 times greater or, for the above values of 20 and 20,000 c.p.s., the lengths will be 76.5 m. and 76.5 mm. respectively. It will be described a little later that the high tones travel almost directly through the ductus cochlearis in the immediate vicinity of the oval and round windows, thus having a path, at the most, of about 1 mm. This means that the phase introduced will be less than $\pi/38$, which is entirely negligible. Similarly for low tones, the location being near the helicotrema, the phase introduced will be of the order of magnitude of $\pi/60$, which is also negligible. This means that the membrane of the round window will bulge outward into the tympanum at almost the same time the stapes is pushed inward.

The compressional wave existing in the fluid exerts some action on the nerve elements which causes stimulation and a resulting action in the nerve which gives a cortical response. According to the resonance theory the separation of tones takes place in the cochlea, giving the desired tonal analysis. The most probable resonating elements are the transverse fibers in the basilar membrane. In reality one should say that the membrane itself responds and that it is subjected to a twofold variation in tension, i.e., a longitudinal and a transverse tension. However, as a first approximation, it is permissible to speak of the fibers responding since at the small

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amplitudes apparently at hand and the lack of apparent significant longitudinal tension, it is doubtful if the drag induced on the neighboring fibers by the continuum is of any more import than the forced vibrations of these fibers due to their being so nearly in tune with the impressed force. At any event, the responding part will in reality be a small portion of the membrane, the maximum displacement taking place in the element exactly tuned while the neighboring elements respond to a lesser degree as the distance from the maximum increases. This results in a form of the basilar membrane as shown in the following figure.

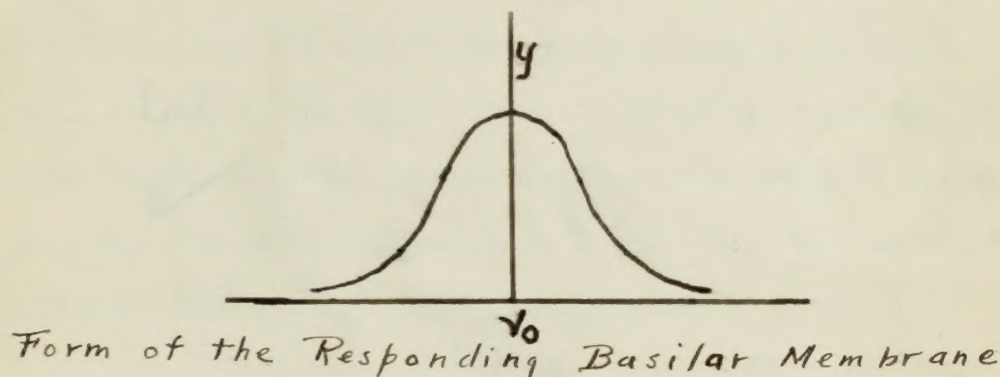


Figure 3

The fibers, then, will be considered as responding to the sinusoidal compressional wave of the fluid. It is well known that if a string is fixed at both ends and is to perform transverse vibrations, the frequency is determined by the dimensions and constants of the system. Thus, for the fundamental mode the frequency is given by:

$$(13) \quad n = \frac{1}{2L} \sqrt{\frac{t}{m}}$$

where n is the frequency, L the length of the string, t the tension, and m the mass per unit length of string.

The equation as it stands above cannot be used directly since the values

amplitudes apparently at hand and the lack of apparent significant longitudinal tension, it is doubtful if the force induced on the neighboring fibers by the continuum is of any more import than the forced vibrations of these fibers due to their being so nearly in tune with the impressed force. At any event, the responding part will inevitably be a small portion of the membrane, the maximum displacement taking place in the element exactly tuned with the neighboring elements respond to a lesser degree as the distance from the maximum increases. This results in a form of the partial membrane as shown in the following figure.

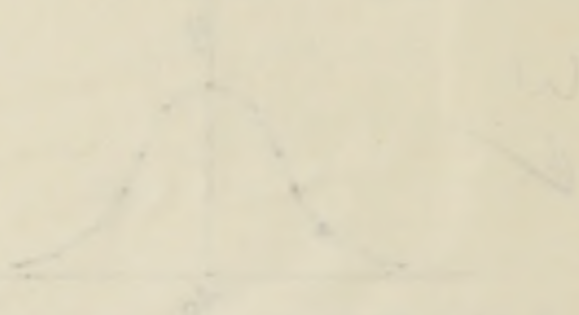


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$$n = \frac{1}{2L} \sqrt{\frac{T}{\mu}} \quad (13)$$

where n is the frequency, L the length of the string, T the tension, and μ the mass per unit length of string.

The equation as it stands above cannot be used directly since the values

of some of the quantities involved are not known and to assume them outright would be a questionable procedure. In the section on anatomy it was found that there was a variation in fiber length amounting to approximately 3 to 1. Also, there was an apparent variation in tension which cannot be evaluated. A third factor enters which might be overlooked on first consideration; this is the loading due to the column of liquid. Obviously this loading increases from base to apex, which is exactly what is wished, since the longer fibers and the smaller tensions are at the apical end. With these facts in mind, equation (13) will be modified so that it may be used.

In place of m may be substituted the quantity obtained by multiplying the path distance from the oval window to the vibrating strip and then back to the round window, by the width of the minute strip responding, and the result obtained by the density. As the equation then stands it will be possible to calculate the corresponding value of t and see if it is a practically possible value. Equation (13) thus transforms to:

$$(14) \quad n = \frac{1}{2L} \sqrt{t/dbD}$$

where: d = distance from oval window to vibrating strip, plus
distance from vibrating strip to round window,
 b = breadth of responding strip,
 D = density (assumed as unity).*

Using this formula and setting the value of the upper limit of hearing as 20,000 c.p.s., the value of t may be calculated. Obviously if all lengths are expressed in centimeters, the calculated value of t will be in dynes. Let b be assumed as 0.05 mm., which is probably much too great but can be used as an approximate value. Carrying out the the calculation gives:

*This is somewhat questionable but if the liquid is approximately the same as the cerebrospinal fluid, and there is reason to believe it is, the assumption is justified for the order of accuracy attained in this discussion.

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$$(14) \quad m = \frac{1}{2L} \sqrt{\frac{2}{\rho}} \quad \rho = \text{density (assumed as unity).}$$

where: L = distance from oval window to vibrating strip, plus distance from vibrating strip to round window,

ρ = breadth of responding strip,

D = density (assumed as unity).

Using this formula and setting the value of the upper limit of hearing as 20,000 c.p.s., the value of t may be calculated. Obviously if all lengths are expressed in centimeters, the calculated value of t will be in dynes. Let D be assumed as 0.05 gm., which is probably much too great but can be used as an approximate value. Carrying out the calculation gives:

*This is somewhat questionable but if the liquid is approximately the same as the corresponding fluid, and there is reason to believe it is, the assumption is justified for the order of accuracy attained in this discussion.

$$t_a = 4.096 \text{ dynes} = .41 \text{ grams (force),}$$

where t_a = tension at the upper limit of audition. Taking the lower limit of audition as 20 c.p.s., L as 0.045, and d as 6.5, gives:

$$t_b = 1.053 \text{ dynes} = .001 \text{ grams (force),}$$

where t_b = tension at the lower limit of audition. These values are for a strip 0.05 mm. in width and thus will be 8.2 grams and 0.02 grams, respectively, referred to a strip 1 mm. in width.

In order to determine if these tensions could be reasonably expected to exist, two experimenters* carried out experiments to determine the strain necessary to break various tissues having a section 1 mm. in width and 0.003 mm. in thickness. The results obtained are listed in the following table.

Table 2

Silkworm gut	150	grams.
Human hair (1)	61	"
Human hair (2)	83	"
Human hair (3)	54	"
Mouse tail tendon	69	"

Thus, it is seen that the tension necessary to tune the basilar fibers is well within the physiological limits possible. If, then, the cochlea is the place of tonal analysis this shows that it is possible for the basilar membrane to carry out this analysis. The attitude maintained here is not to contend for or against this viewpoint but merely to describe it and see if it be a reasonable hypothesis concerning the theory of hearing.

In many articles, mention is made of possible resonance effects of the drum-skin and tympanum as having possible influence on the mechanism. This

*Wilkinson and Gray - The Mechanism of the Cochlea.

$$t_a = \frac{1.083 \text{ dynes}}{X} = 4.1 \text{ grams (force)},$$

where t_a = tension at the upper limit of audition. Under the lower limit

of audition as 20 c.p.s., 1 as 0.068, and 8 as 8.8, given:

$$t_b = \frac{1.083 \text{ dynes}}{X} = .001 \text{ gram (force)},$$

where t_b = tension at the lower limit of audition. These values are for a

width 0.08 cm. in width and time will be 8.8 grams and 0.02 grams, respec-

tively, referred to a width 1 cm. in width.

In order to determine if these tensions could be reasonably expected to

exist, two experiments* carried out experimentally to determine the strains

necessary to break various tissues having a section 1 cm. in width and 0.002

cm. in thickness. The results obtained are listed in the following table.

Table 2

Human hair (1)	81	150 grams.
Human hair (2)	83	"
Human hair (3)	84	"
Human hair tension	85	"

Thus, it is seen that the tension necessary to break the smaller fibers is

well within the physiological limits possible. If, then, the cochlea is the

place of basal analysis this shows that it is possible for the smaller con-

ditions to carry out this analysis. The attitude maintained here is not to

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In any analysis, mention is made of possible resonance effects of the

drum-skin and tympanic membrane as having possible influence on the mechanism. This

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is a rather absurd point if one considers the mechanics of the situation. The only possible contributing element would be the action of the tympanum and its associated air chambers. This, then, would consist of the chamber playing the part of a resonator. From the volume of the tympanum plus the air cells in the mastoid and the mastoid antrum, it is obvious that the only place of contribution would be at extremely high frequencies, in all probability so high that the ear would not appreciate them as sound. The only resonance effect it seems logical to include is the resonance of the entire system, which, in reality, lies in the tuned elements of the cochlea and is reflected to the drum-skin by the ossicles acting as a transformer. This resonance is distributed over a frequency range varying from 20 c.p.s. to 20,000 c.p.s. It is impossible to calculate the value for which this system of air-filled cavities would resonate since the volume and mode of connection is not known very definitely.

The fact that the theory frankly assumes the responding part of the basilar membrane to be a strip, leaves an opening that some believe to invalidate it as a working basis. This undoubtedly means that other nerve endings beside those representing the "string" tuned to the driving frequency are also delivering action currents to the brain. Thus the higher center is not receiving the simple message implied, but a complex one due to the neighboring elements. Here again Wilkinson and Gray offer a plausible explanation which is called the Principle of Maximum Stimulation. By way of explanation of this principle, consider tactile sensation as the sensory medium used. If a stimulus is applied over considerable area in such a way that one point receives a more intense stimulation than the others, the subject is conscious of the sensation only at the point of maximum stimulus. (Of course the area must not be too large.) Generalizing from the tactile reception to auditory

is a rather absurd point if one considers the mechanism of the situation. The only possible contributing element would be the action of the tympanum and the associated air chambers. This, then, would consist of the chamber vibrating the part of a resonator. From the volume of the tympanum plus the air in the middle ear and the middle ear, it is obvious that the only place of contribution would be at extremely high frequencies, in all probability so high that the ear would not appreciate them as sound. The only resonance effect it seems logical to include is the resonance of the entire system, which, in reality, lies in the tuned elements of the cochlea and is reflected to the drum-skin by the ossicles acting as a transformer. This resonance is distributed over a frequency range varying from 20 c.p.s. to 20,000 c.p.s. It is impossible to calculate the value for which this system of air-filled cavities would resonate since the volume and mode of connection is not known very definitely.

The fact that the theory frankly assumes the responding part of the hearing mechanism to be a strip, forces an opinion that now belongs to invalidity as a working basis. This undoubtedly means that other nerve endings besides those representing the "strips" tuned to the hearing frequency are also delivering action currents to the brain. Thus the higher center is not receiving the simple message implied, but a complex one due to the neighboring elements. Here again Huxley and Gray offer a plausible explanation which is called the Principle of Maximum Stimulation. By way of explanation of this principle, consider tactile sensation as the sensory medium used. If a stimulus is applied over considerable area in such a way that one point receives a more intense stimulation than the others, the subject is conscious of the sensation only at the point of maximum stimulation. (Of course the area must not be too large.) Generalizing from the tactile sensation to auditory

sensation it is evident that the desired explanation is obtained. The question of acceptance of this explanation is largely a matter of personal opinion.

Mention must be made of the phenomenon of beat-notes. Thus, if two tones of nearly the same frequency stimulate the auditory apparatus simultaneously, the subject becomes conscious of an apparent wavering in the intensity. To explain this it is only necessary to consider the two neighboring points of the membrane which are responding. They are located so that a portion of one overlaps a portion of the other, being activated by the two different driving frequencies. This means that they will periodically receive a maximum displacement when the phase angle between the driving tones vanishes. The period of the phenomenon will of course be just the difference in the periods of the primary tones. Since the phenomenon is periodic the sensation elicited is that of a wavering intensity.

In this connection is a very similar phenomenon which Thomas Young claimed to be closely connected with the above, but which Helmholtz believed to be essentially distinct. This is the appearance of combinational tones or subjective tones. Young claimed the beat-note was merely the lower limit of combination tones. The best explanation of these so-called summation and difference tones is similar to that used earlier when explaining what happens if the middle ear system introduces a harmonic distortion by non-linearity. Instead of passing on to the cochlea a wave compounded directly from the primary tones, it passes on a spectrum consisting of the sum of these, the difference between them, the sum of the fundamental of one plus or minus the first harmonic of the other, etc. The only limitation introduced is by the frequency limits or by the intensity limits of the ear. Formulated very briefly, this would mean that the driving pressure is

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Attention must be made of the phenomenon of beat-notes. Thus, if two tones of nearly the same frequency stimulate the auditory apparatus simultaneously, the subject becomes conscious of an apparent variation in the intensity. To explain this it is only necessary to consider the two neighboring points of the waveform which are responding. They are located so that a portion of one overlaps a portion of the other, being motivated by the two different driving frequencies. This means that they will periodically receive a certain displacement when the phase angle between the driving tones varies. The period of the phenomenon will of course be just the difference in the periods of the primary waves. Since the phenomenon is periodic the connection effected is that of a varying intensity.

In this connection is a very similar phenomenon which Thomas Young related to be directly connected with the above, but which Helmholtz believed to be essentially distinct. This is the appearance of combination tones or subjective tones. Young stated the beat-note was merely the lower limit of combination tones. The best explanation of these so-called combination and difference tones is similar to that used earlier when explaining what happens if the middle ear system functions as a harmonic oscillator by non-linearity. Instead of passing on to the cochlea a wave compounded directly from the primary tones, it passes on a spectrum consisting of the sum of these, the difference between them, the sum of the fundamental of one plus or minus the first harmonic of the other, etc. The only limitation introduced is by the frequency limits or by the intensity limits of the ear. Formulated very briefly, this would mean that the driving pressure is

represented by:

$$(15) \quad y = p = p_1 \cos 2\pi n_1 t + p_2 \cos 2\pi n_2 t$$

The inner ear spectrum would then be obtained by substituting this value in equation (9). This would result in terms containing powers of the single terms on the right-hand side of (15) and also products of these two terms. As an example a few terms will be given, where they are equated to the terms appearing in (9) *.

$$(16) \quad \begin{aligned} a_0 &= a_0 \\ a_1 y &= a_1 (p_1 \cos 2\pi n_1 t + p_2 \cos 2\pi n_2 t) \\ a_2 y &= a_2 \left[\frac{1}{2} p_1^2 \cos 4\pi n_1 t + \frac{1}{2} p_2^2 \cos 4\pi n_2 t \right. \\ &\quad \left. + p_1 p_2 \{ \cos(2\pi n_1 t - 2\pi n_2 t) + \cos(2\pi n_1 t + 2\pi n_2 t) \} \right. \\ &\quad \left. + \frac{1}{2} (p_1^2 + p_2^2) \right] \\ &\quad \text{etc.} \end{aligned}$$

All work on the phenomenon of combinational tones has been carried out from a subjective point of view only. Thus the subject reports that he hears a certain tone which is not present in the objective spectrum. Work of this type is always open to question since it is possible to think that one hears many things which are not there. Experiments on a few patients will readily convince one of this. Also, it seems important to consider the intensity level of the incoming waves as it would be reasonable to suppose that the non-linearity appears only when the system is handling an excessive power load. Objective experiments must be performed on this subject before one can say definitely what does occur.

The only point left for consideration in the cochlear activity is the transformation of the mechanical motion into nervous activity. At the time of Helmholtz this function was thought to be carried out by the impact of

* See Fletcher, loc. cit. page 312.

represented by:

$$(13) \quad p = p_1 \cos 2\pi n_1 t + p_2 \cos 2\pi n_2 t$$

The lower ear spectrum would then be obtained by substituting this value in equation (9). This would result in terms containing powers of the sines and cosines of the right-hand side of (13) and also products of these two terms. As an example a few terms will be given, where they are added to the terms appearing in (9).

$$(14) \quad a_0 = a_0$$

$$a_1 y = a_1 (p_1 \cos 2\pi n_1 t + p_2 \cos 2\pi n_2 t)$$

$$a_2 y = a_2 \left[\frac{1}{2} p_1^2 \cos 4\pi n_1 t + \frac{1}{2} p_2^2 \cos 4\pi n_2 t + p_1 p_2 \cos 2\pi (n_1 + n_2) t \right]$$

$$+ p_1 p_2 \left[\cos (2\pi n_1 t - 2\pi n_2 t) + \cos (2\pi n_1 t + 2\pi n_2 t) \right]$$
$$+ \frac{1}{2} (p_1^2 + p_2^2)$$
$$+ \dots$$

All work on the phenomenon of non-linear tones has been carried out from a subjective point of view only. Thus the subject reports that he hears a certain tone which is not present in the objective spectrum. Some of this type is always open to question since it is possible to think that one hears many things which are not there. Experiments on a few subjects will readily convince one of this. Also, it seems important to consider the intensity level of the incoming waves as it would be reasonable to suppose that the non-linearity appears only when the system is handling an excessive power load. Objective experiments must be performed on this subject before one can say definitely what does occur.

The only point left for consideration in the case of activity is the transformation of the mechanical action into nervous activity. At the time of Helmholtz this function was thought to be carried out by the input of

the cilia of the hair cells against the inferior surface of the nearby tectorial membrane. However, it is now known that the tectorium is actually in contact with the cilia. It would seem most logical to assume that as the basement member vibrates, carrying with it the sensitive endings, it displaces the tectorium with it; but as the upper member is moved it tends to produce a shearing motion on the cilia since the membrane must rotate about its point of contact with the denticulata. Thus the upward and downward excursions of the Organ of Corti would result in a backward and forward motion of the cilia which can be assumed to set off the nervous process.

The entire discussion of this point has been considered from the most simple possible point of view; that is, for a pure tone stimulation. The action of the cochlea, when a compound tone is impressed on it, is apparently an analysis into the constituent simple tones. This is very similar to the mathematical process used when a complex periodic function is decomposed into its elementary components by means of a Fourier analysis. This is obviously possible since any function may be synthesized, over a limited range of the variable, by means of adding a sufficient number of terms of the sine or cosine functions. Any range may be obtained by introducing a change of scale. In an aural analysis this necessity for choosing the proper period of the argument is obviated since the function is periodic, the fundamental being at least the frequency of the lower limit of audition. Thus, if the resonance theory of hearing is accepted, the tonal analysis is explained with a minimum of extraneous factors.

The nervous activity after stimulation of the end organs remains for discussion. This is an extremely interesting subject and at present is attracting widespread attention and much experimentation. In order to discuss it intelligently a few facts regarding neuro-physiology will be mentioned.

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simple possible point of view; that is, for a pure tone stimulation. The action of the cochlea, when a compound tone is impressed on it, is apparently an analysis into the constituent simple tones. This is very similar to the mathematical process used when a complex periodic function is decomposed into its elementary components by means of a Fourier analysis. This is obviously possible since any function may be synthesized, over a limited range of the variable, by means of adding a sufficient number of terms of the sine or cosine functions. Any range may be obtained by introducing a change of scale. In an actual analysis this necessity for choosing the proper period of the argument is avoided since the function is periodic, the fundamental being at least the frequency of the lower limit of analysis. Thus, if the resonance theory of hearing is accepted, the tonal analysis is explained with a minimum of extraneous factors.

The nervous activity after stimulation of the ear organ remains for discussion. This is an extremely interesting subject and at present is attracting widespread attention and much experimentation. In order to discuss it intelligently a few facts regarding neuro-physiology will be mentioned.

Nervous tissue possesses a peculiar property known as excitability. If a fiber of the tissue is struck, acted on by some chemical, subjected to heat, or shocked by an electric current, the property of excitability is manifested. The detection of the activation can be obtained by dealing with a nerve connected with the muscle it supplies and noting a contraction of the muscle when the stimulus is applied to this motor nerve. If the nerve be allowed to dry, or if it be immersed in certain toxins, the excitability is lost. A much nicer method of studying the properties of excitation; and one that must necessarily be used when dealing with sensory nerves, if the experiment is to be objective; is to make electrical connections to the nerve which lead to a sensitive string galvanometer, say of the Einthoven type. Now, when the nerve becomes active a deflection of the string is noted, the displacement being proportional to the strength of nerve current.

Much work has been carried out along this line and a very unusual characteristic has been discovered to be generally true for tissue activation. Suppose that the stimulus is a make-and-break current which can be varied in intensity. If the intensity is at first weak no response to the stimulus is obtained, but as this strength is gradually increased, a point is reached, at or above which the nerve responds. Thus there exists a definite threshold which must be exceeded in order to cause nervous excitation. A second general property found to be valid is that known as the All or None law. Again supposing a single conducting fiber, it is found that when the nerve does discharge its activity, it does so with maximum response for any stimulus above the threshold. This means that when the threshold stimulus is reached the nerve discharge immediately responds with the greatest possible action current. To a physicist this is a quantized effect which is to-day so familiar. So much for a single stimulus.

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To the person who would compare the process of nerve conduction to that of an electrical pulse traveling in a wire, the single impulse response shows no discrepancies but when the stimulating impulse is applied repeatedly with only short intervening rest periods, the analogy comes to grief. Experience has shown that when a nerve discharges it lapses into a state that permits no activation for a short period of time, following which is a period where stimulation can be effected only at the price of increased stimulus intensity. The nerve returns to its final state of excitability after a short period of time. The period of inexcitability is known as the absolute refractory period and that of decreased excitability is termed the relative refractory period. These quantities differ for different nerves.

The absolute refractory period for human nervous tissue of the medullated variety has been found to average around 0.001 second with the relative refractory period amounting to some 0.004 second. Thus, if this is to hold for the nervus acusticus the maximum number of impulses possible would be 1000 per second, while stimulation at threshold values should not exceed 200 per second.

The theory of the mechanism of nervous conduction is still in an extremely hypothetical state. It is known that it is a property found only in living tissue. Thus it may be immediately inferred to involve a metabolic process. The mechanics of the process as accepted at present are somewhat as follows: a hypothetical membrane of a semipermeable nature exists somewhere within the axis cylinder of the nerve. This membrane allows negatively charged ions to collect inside the surface while the positively charged companion particles are segregated externally. Excitation is a process which breaks down the existing barrier and allows the oppositely charged ions of the "Helmholtz double layer" to unite, leaving a region having no separated charge density. The ions in the immediate vicinity are attracted to the region of zero charge

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The theory of the mechanism of nervous conduction is still in an extremely hypothetical state. It is known that it is a property found only in living tissue. Thus it may be immediately inferred to involve a retentive process. The mechanism of the process as accepted at present are somewhat as follows: a hypothetical membrane of a non-permeable nature exists somewhere within the axis cylinder of the nerve. This membrane allows negatively charged ions to collect inside the surface while the positively charged companion particles are segregated externally. Excitation is a process which breaks down the existing barrier and allows the oppositely charged ions of the "Helmholtz double layer" to unite, leaving a region having no separated charge density. The ions in the immediate vicinity are attracted to the region of zero charge

density thus causing a new section of the membrane to be broken down and instituting a spread of the activity. Heat is probably evolved during the actual flow but the real metabolic process undoubtedly enters in the restoration of the membrane with the separated charges accumulated on either side. This view will probably be profoundly altered in the final analysis, but it furnishes a tentative working hypothesis.

With these facts as a background, let the auditory phenomenon be considered. It is known that the ear appreciates frequencies far in excess of those capable of transmission over the nerve trunk, according to the above discussion. How is one to explain the conduction of frequencies as rapid as, say, 20,000 per second? The proponents of the resonance theory would do this by assuming that the end organ discharges only after recovery though it may have been stimulated any number of times since the previous discharge. Thus, it will be activated after, say 100 stimulations; depending only on the time necessary for recovery, and the frequency of stimulation. Since the path is over a myelinated nerve fiber, the resulting action current will stimulate a definite region of the cortex. This explanation tacitly assumes that tonal sensation is a space representation in the cortical center. A time pattern has been suggested but seems extremely questionable and will not be discussed.

In 1930 an interesting and important contribution was made by Wever and Bray* which is sufficiently important to warrant a brief review here. An experimental, a cat, was placed under deep anesthesia and subjected to craniotomy, the skull vault being opened at the occipito-lateral aspect. The result was the exposure of the anterior aspect of the cerebellar hemisphere which could be lifted up and thus expose the eighth nerve. An electrode was lead off from the nerve to the grid terminal of an amplifier; the ground

* Proceedings of the National Academy of Science - 1930 - vol. 16.

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lead was attached to indifferent tissue of the incision. The currents after amplification actuated a telephone receiver. It was feared that the use of electrical stimulating devices (sound sources) might lead to "cross-talk" between the stimulating source and the amplifier leads, so various mechanical devices, as whistles or tuning forks, were used.

The animal and one man were placed in a room while the other observer was in another room some 50 or 60 feet distant. The ear of the cat was stimulated with one of the various sound sources while the other observer listened over the ear phone. The reports were very consistent and spoken words delivered to the cat's ear could be repeated by the distant observer with accuracy. During the course of the experiment many sources of sound having frequencies greater than should be transmitted by the nerve were found to be reproduced with good fidelity. If these facts are taken per se it leads to the conclusion that the absolute refractory period of the acoustic nerve must be of exceptionally short duration. That the effect is a reality is sanctioned by further reports from Adrian^{*}; one of the foremost neurophysiologists, who confirmed the findings of Wever and Bray.

Work has been taken up along this line by numerous laboratories, both in this country and abroad. From Harvard Medical School came the report that it was not necessary to connect the active electrode to the nerve since the effect is obtained equally well if this electrode is in contact with the neighboring petrous bone or the secondary tympanic membrane. This was explained on the basis of action currents generated by the end-organs, and since the organ is immersed in a liquid the currents circulate about, thus spreading to neighboring regions. The experimental equipment used there has been increased until they now have a formidable display of apparatus which is equipped to

^{*}Discussion on Audition, The Physical Society, London, June, 1931.

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take photographs of the amplified wave form by means of a Braun Tube.* It is reported that the currents thus obtained are very different from the true action currents obtained from the lateral fillet at one of the way-stations in the mesencephalon.**

The pictures reproduced for the currents obtained from the round window are faithful reproductions of the stimulating wave. This has an interesting consequence. Since the resulting currents become both positive and negative with respect to the indifferent tissue, it must be assumed that the mechanism which converts the mechanical stimuli into electrical phenomena is capable of generating both positive and negative potentials. It is to be expected that within the next few years the accumulated facts will be sufficient to state the law of hearing.

An interesting fact is noted in the above reference. One of the animals used showed the usual currents from the petrous bone but no response could be obtained from the nerve. Investigations to determine the reason for this revealed an inflammatory labyrinthitis. Apparently a lesion of this type can affect the excitability of the nerve fibrils while leaving the transducer elements intact.

* See H. Davis, A.J. Derbyshire, et al. Amer. Jour. of Physiology CVII.

** For description see H. Davis and E.L. Garceau, Am. J. of Physiology CVII.

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It seems well to devote a few pages to the proposed theories of hearing since it is now possible to judge their merit on the basis of the previous discussion. The theories which have been proposed may be grouped in two general classes: (1) Resonance Theories, and (2) Nerve-response Theories.

SECTION I

NERVE-RESPONSE THEORIES

Nerve-response theory of hearing is the oldest working hypothesis and has probably received the greatest support of workers in the past. This was suggested as a possible basis of tone perception by a number of workers previous to Helmholtz, among whom may be mentioned Gougenon, LeCot, Charles Bell, Job. Mueller and Thomas Young. To Helmholtz, however, must be given the credit

PART III

for seeking out the parts upon which the desired functions and formulating the theory to fit the known anatomy of the organ and explaining certain subjective phenomena known to exist.

THEORIES OF HEARING

The theory of THEORIES OF HEARING is established within the cochlea, synchronical with the sound wave and that the basilar membrane contains fibers tuned to this array of frequencies and hence possible of carrying out the analysis of compound waves and passing on to the brain a definite array of pure tones. The pattern on the brain may be looked upon as a space pattern of cell activation or it may be regarded as a time pattern; the choice depending on the action of discharge in the cochlea which is accepted. A number of experimental facts are cited to justify this theory; a few of these are: (1) Limitation of audibility at one or both ends. This can be shown in individuals who are apparently normal and whose hearing is normal in other respects. It may be explained as due to individual abnormality in the cochlear development.

PART IIITHEORIES OF REARER

It seems well to devote a few pages to the proposed theories of hearing since it is now possible to judge their merit on the basis of the previous discussion. The theories which have been proposed may be grouped in two general classes: (1) Resonance Theories, and (2) Non-resonance Theories.

SECTION 1

RESONANCE THEORIES

The resonance theory of hearing is the oldest working hypothesis and has probably received the greatest support of workers in the past. This was suggested as a possible basis of tone perception by a number of workers previous to Helmholtz, among whom may be mentioned Cotugno, LeCat, Charles Bell, Joh. Mueller and Thomas Young. To Helmholtz, however, must be given the credit for seeking out the parts capable of executing the desired functions and formulating the theory to fit the known anatomy of the organ and explaining certain subjective phenomena known to exist.

The theory asserts that an alternating pressure wave is established within the cochlea, homorhythmical with the sound wave and that the basilar membrane contains fibers tuned to this array of frequencies and hence possible of carrying out the analysis of compound waves and passing on to the brain a definite array of pure tones. The pattern on the brain may be looked upon as a space pattern of cell activation or it may be regarded as a time pattern; the choice depending on the action of discharge in the cochlea which is accepted. A number of experimental facts are cited to justify this theory; a few of these are: (1) Limitation of audibility at one or both ends. This can be shown on individuals who are apparently normal and whose hearing is normal in other respects. It may be explained as due to individual abnormalities in the cochlear development.

It seems well to devote a few pages to the proposed theories of hearing since it is now possible to judge their merit on the basis of the previous discussion. The theories which have been proposed may be grouped in two general classes: (1) Resonance Theories, and (2) Non-Resonance Theories.

SECTION I

RESONANCE THEORIES

The resonance theory of hearing is the oldest working hypothesis and has probably received the greatest support of workers in the past. This was suggested as a possible basis of tone perception by a number of workers previous to Helmholtz, among whom may be mentioned Helmholtz, Ratzel, Charles Bell, Job. Mueller and Thomas Young. To Helmholtz, however, must be given the credit for seeking out the parts capable of executing the desired functions and formulating the theory to fit the known anatomy of the organ and explaining certain subjective phenomena known to exist.

The theory asserts that an alternating pressure wave is established within the cochlea, hemodynamically with the sound wave and that the basilar membrane contains fibers tuned to this array of frequencies and hence capable of carrying out the analysis of compound waves and passing on to the brain a definite array of pure tones. The pattern on the brain may be looked upon as a space pattern of cell activation or it may be regarded as a time pattern; the choice depending on the action of discharge in the cochlea which is accepted. A number of experimental facts are cited to justify this theory a few of these are: (1) Limitation of audibility at one or both ends. This can be shown on individuals who are experimentally normal and whose hearing is normal in other respects. It may be explained as due to individual abnormalities in the cochlear development.

(2) Lowered acuity at a particular frequency or particular frequency range due to continued exposure to loud noise in that range. This is supposedly the destruction of the nerves lying in that region of the organ due to excessive and continuous function. This may be shown to be the case by exposing an animal for a long period of time to a continuous source of sound of considerable intensity. Post-mortem examinations of the organ show a destruction of the Organ of Corti for a definite region which differs for different sound frequencies.

(3) The presence of tone islands, other tones outside of the region having no effect on the organ. This is readily explained as the congenital failure in development of other portions of the organ if the deafness is of the congenital class, or due to injury to the remainder of the organ if the deafness is acquired.

These facts, together with the anatomical and physiological facts discussed earlier, present the principal thesis of those writers who accept the resonance theory with the basilar membrane as the active agent in the analysis.

A second resonance theory has been advanced and is supported by some workers in the field. This theory is much the same as the previous, but places the function of the active part of exciting the sense organ with the tectorial membrane rather than with the basilar membrane. It is supported by Siebemann, Kishi, Shambaugh, Hardesty and some others. They assume the differentiation in resiliency to replace the differentiation in tension found in the basilar membrane and, the other factors being the same in the two cases; this allows the function of analysis to be carried out here instead of in the basilar membrane. The reason they dislike to assume the basilar membrane as the active agent is due to the placement of the Organ of

(2) Lowered acuity at a particular frequency or particular frequency range due to continued exposure to loud noise in that range. This is supposed to be the destruction of the nerve fibers in that region of the organ due to excessive and continuous vibration. This may be shown to be the case by exposing an animal for a long period of time to a continuous source of sound of considerable intensity. Post-mortem examinations of the organ show a destruction of the organ of Corti for a definite region which differs for different sound frequencies.

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Corti upon it which would tend to prevent it resonating as an ordinary tuned string; and also the fact that this is a continuous membrane rather than a discrete series of progressively tuned strings. In the literature there is no direct experimental evidence which bears out this theory.

This is, in the main, the presentation of the resonance hypothesis offered in explanation of the theory. There remains for discussion the second class which by no means agree with the assumptions made by the preceding. These alternative views will now be discussed.

SECTION 2

NON-RESONANCE THEORIES

The group of theories advanced in this section reject the hypothesis which forms the groundwork of the resonance theory and consequently are most easily classified as non-resonance theories of hearing.

An investigator in this field (W. Rutherford) in 1886 put forward the idea that the basilar membrane instead of vibrating at a definitely localized region, followed the aerial movements as a whole, such as is carried out by the diaphragm of a telephone receiver in responding to the frequencies impressed on it. Further, the nerve impulses sent along the auditory nerve correspond exactly to the movements of the basilar membrane. Thus there arrives at the auditory center a fluctuating series of nerve impulses and the analysis of these is carried out at that place.

This at first seemed simple in the extreme and gathered a large number of adherents. Later analysis of this so called "telephone theory" proved its possibilities of existence extremely questionable, both from the mechanical and the neurological viewpoints, and it now receives little or no support.

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This at first seemed simple in the extreme and gathered a large number of adherents. Later analysis of this so-called "telephone theory" proved its possibilities of existence extremely questionable, both from the mechanical and the neurological viewpoints, and it now receives little or no support. A second member of this group is the "pressure pulse" theory which was

advanced in 1891 by A. Waller and later elaborated by R. Ewald. Here also, the response of a definite level of the basilar membrane for a particular tone is rejected. The alternative offered is that the pressure wave sets up a standing wave pattern on the membrane which is unique for each different pitch. The message passed on to the higher center is a definite space pattern and each different pattern is recognized as a distinct tone.

To give an experimental demonstration of this method, Ewald evolved the "Acoustic Camera", the construction of which will be described. A box is divided into two portions by a metal plate which has a narrow slit down its center. Covering the slit is a membrane which was formed by painting over the opening a film of rubber dissolved in benzol and then allowing it to harden. Openings are provided to the compartments on either side of the plate and correspond to the two fenestrae. The box is filled with water to represent the cochlear liquid. The rubber membrane was observed with a microscope through a glass window while a tuning fork was applied to the oval window. It was found that a standing wave pattern was formed and the pattern was different when different forks were applied. This was accepted as a proof.

The model is an unfair representation of the basilar membrane in that it entirely neglects the differentiation of length found in the membrane. The variation of tension, if such be admitted to exist in the basilar membrane in the functioning condition, is entirely neglected in this model. A further question arises when one considers the drying of the rubber membrane. It seems logical to assume that various haphazard tensions would be represented along its surface due to irregularities in the drying process. This is viewed by opponents of the theory as sufficient evidence to discard it from the plausible explanations of the process.

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As a final member of this group there is the "Traveling Bulge" theory which has been advanced, with various personal variations, by several writers, as Hurst, ter Kuile, Meyer, and Watt. The process involved by this theory is that the inward thrust of the stapes causes a bulge in the basilar membrane which travels upward along this member until the opposite movement at the oval window extinguishes the excess pressure and causes a movement of the basilar membrane in the opposite direction. The particular sensation of pitch elicited depends on the distance along the membrane the bulge has traveled before it is removed. Physically, one can see little ground for explanation of the theory. Neurologically it is also questionable. It resorts to a "central analysis" and some feel that this is sufficient to warrant its being disregarded.

In the entire discussion no mention has been made of the ability of the ear to locate, or localize, sound. This should be capable of explanation by a sufficiently developed and all-inclusive theory of hearing. The proponents of the resonance theory explain it as a difference in time of arrival of the action current at the center. That is to say, the difference in the phase of the same wave in the train gives rise to a difference in the time of stimulation which is used by the brain as an index in localizing the direction of the source. No very definite statements can be made regarding this subject at the present time since much of the data obtained in the literature gives conflicting results regarding localization of pure tones. Some workers believe the phase to be the determining factor, while others say it is the intensity, and a third group, being more magnanimous, say that both are active in the determination. This is one of the subjects in hearing which requires more attention before hard and fast rules are applied to it.

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SECTION 3

BONE CONDUCTION

It has long been known that a source of sound, when placed in contact with the cranial bones causes a sensation of hearing. This faculty has been utilized in two important diagnostic tests (for description see the following section), known as the Weber Test and the Rinne' Test. Up to the time of the audiometer it was necessary to use tuning forks as the source and consequently a normal bone conduction was rather questionable as the sound was also propagated in the air, resulting in an admixture of air and bone conduction. The normal (statistical) bone conduction has been determined with the audiometer and bone conduction receiver and the curve of threshold against frequency is shown in the acuity curve in the following part.

Three means of conduction of the sound from the point of application to the cochlea have been advanced. These are (1) Craniolabyrinthine - this mode consists of the imparting of the motion to the bones which in turn transport it to the labyrinth and convey the motion to the cochlear fluid. (2) Craniotympanic - the sound is propagated by the bones to the tympanic ring which is set in vibration. This results in the motion of the membrane and thence the route of conduction is identical with the air borne route. (3) Craniopneumotympanic - the sound sets the skull in vibration which communicates the motion to the air in the various chambers, thus causing them to resonate. The external auditory meatus is to be considered a resonant member which causes the sound course thenceforward to be the same as air borne sounds.

Examining the process from a purely physical point of view the mechanism would seem somewhat as follows. The vibrations from the stem of a

SECTION 2

BONE CONDUCTION

It has long been known that a source of sound, when placed in contact with the external bones causes a sensation of hearing. This faculty has been utilized in two important diagnostic tests (for description see the following section), known as the Weber Test and the Rinne Test. Up to the time of the audiometer it was necessary to use tuning forks as the source and consequently a normal bone conduction was rather questionable as the sound was also propagated in the air, resulting in an admixture of air and bone conduction. The normal (statistical) bone conduction has been determined with the audiometer and bone conduction receiver and the curve of threshold

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the cochlea have been advanced. These are (1) Craniofacial vibration - this mode consists of the imparting of the motion to the bones which in turn transmit it to the labyrinth and convey the motion to the cochlear fluid. (2) Craniohypophyseal - the sound is propagated by the bones to the hypophysis which is set in vibration. This results in the motion of the sphenoid and thence the route of conduction is identical with the air bone route. (3) Craniohypophyseal - the sound sets the skull in vibration which communicates the motion to the air in the various chambers, thus causing them to resonate. The external auditory meatus is so considered a resonant chamber which causes the sound waves therefrom to be the same as air bone sounds.

Examining the process from a purely physical point of view the manner in which sound waves are transmitted is as follows. The vibrations from the eardrum

tuning fork or from a bone conduction receiver set up compressional waves in the cranial bones. The compressional waves will be propagated in all directions in the bony structure. Eventually the labyrinthine capsule is reached which offers a discontinuity, but since the density of the bone and fluid are probably of the same order of magnitude, a considerable portion of the energy crosses the surface and sets up corresponding compressional waves in the liquid. Obviously the remainder of the process is identical with that obtained when air borne sounds are used. This method would also fit nicely with certain clinical facts which are observed when pathology involves the conducting mechanism. If the pathology is localized to the conducting elements without having affected the labyrinth, bone conduction is heard with greater ease than air conduction. The other theories seem to defeat this when applied. These theories will not be discussed since they are extremely distasteful from a physical point of view and have little or no support from a clinical basis.

The following statement is quoted by a paper from Crowe*. "In the cat, the bulla and middle ear is opened through an incision in the neck; air conduction and bone conduction are tested and charted as described in previous publications. The middle ear and bulla is then filled with mercury. This fixes both the stapes and round window membrane. Under these conditions air conduction is nil, but bone conduction is actually and measurably improved." This is obviously what would be expected and is not worthy of further discussion except to note that it bears out the theory above.

Bone conduction is extremely interesting and will undoubtedly become of extreme value from a diagnostic viewpoint when sufficient is known about it. It should be stressed that many of the articles which propose that something

* S.J.Crowe. Laryngoscope XLII - p893 - 1932.

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extremely unusual has been found become almost banal when the problem is looked at from a physical point of view. It is unfortunate that many of the experimenters in this field have not the benefit of sufficient background in physics and mathematics.

PART IV

EXPERIMENTAL WORK

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PART III

EXPERIMENTAL, TEST METHOD AND EXPLANATION OF THE HEARING CURVE

In order to test the hearing of a person and determine whether it is normal or affected, it is first necessary to determine a physiological normal. The approach to this can only be through a statistical method where a large number of subjects are tested and the average is taken. The subjects are selected on the basis of age and sex and are tested for hearing at a number of frequencies. The average of the results is taken and this is the normal hearing curve. Since this is the normal, any deviation from it is considered as abnormal. Obviously this is the only correct method of approach, since to say that a person's hearing did not fit exactly on the arbitrary base line was pathologic, would be absurd.

PART IV

EXPERIMENTAL WORK

The sources and methods of sound production are very old and many of the methods of testing are outgrowths of a period when the present, well controlled, scientific instruments were not available. The methods of testing hearing are a series of frequencies lying throughout the auditory range and of a type such that the intensity may be varied, as desired, at will. If the intensity cannot be varied directly, the sound is varied so that the distance at which the observer is just able to hear is determined and this is taken as the intensity of the sound. The most convenient instrument satisfying these conditions was a set of tuning forks for frequencies up to about 2,000 cycles and a Galton whistle for frequencies higher than this. An audiometer may be used for testing in the higher frequency range but does not give an actual value of the hearing loss.

PART IVEXPERIMENTAL WORK

SECTION 1

INSTRUMENTS, TEST METHODS AND EXPLANATION OF THE ACUITY CURVE

In order to test the hearing of a person and determine whether it is normal or affected, it is first necessary to determine a physiological normal. The approach to this can only be through a statistical method where a large number of subjects who are normal in other respects and whose ears show no visible signs of impeded functional ability, are tested and the average of these findings taken as an arbitrary line of hearing. Since this is an average of many observations it must be treated as such and a region about the line of normal hearing determined such that observations falling within this area are considered as normal. Obviously this is the only correct method of approach; since to say that a person whose hearing did not lie exactly on the arbitrary base line was pathologic, would be absurd.

The science and art of testing and treating pathologic ears are very old and many of the methods of testing are outgrowths of a period when the present, well controlled, scientific instruments were not available. The demands of testing hearing are a series of frequencies lying throughout the auditory range and of a type such that the intensity may be varied, at least somewhat, at will. If the intensity cannot be varied directly, the source must be moved so that the distance at which the observer is just able to perceive the sound may be measured and this used as an index to the intensity at the ear. The most convenient instruments satisfying these conditions are a set of tuning forks for frequencies up to about 2,000 cycles and a Galton whistle for frequencies higher than this. An acoumeter may be used for testing in the higher frequency range but does not give an actual value of the hearing loss.

SECTION I

INSTRUMENTS, TEST METHODS AND EXPLANATION OF THE ACUITY CURVE

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From physical experiments with a tuning fork it is well known that the intensity of the sonorous wave given off decreases exponentially with the time. Thus, after any given period of time the intensity of the wave is known, provided the initial intensity was known. This means, then, that an observation of the time necessary for the tone from the fork to become inaudible is a measure of the power necessary to elicit the sensation of hearing in the ear of the individual. Obviously, if the ear is diseased so that the mechanism is impeded for that particular tone, the time reported by the patient will be considerably shorter than in the case of a normal ear. The decrease in hearing time compared with that of a normal individual shows the percentage of the functional loss.

The acoumeter, spoken of before, was designed by Politzer and merely tests the ability of the ear to hear the high tones, without giving any indication of the amount of functional disability. This instrument is a little steel bar which is attached to a holder; also attached to this holder is a small weight capable of free rotation about its point of support. The weight is rotated away from the steel bar until a fixed distance above the bar is reached; it is then allowed to drop freely and impact the bar, thus causing a high frequency, metallic click. An ear showing deafness for high tones, a so called nerve deafness, will not be able to perceive this sound.

A second test which is of value in the routine examination is for the bone conduction. The base of a sounding tuning fork is applied to the skull and the patient asked to signal when the sound becomes inaudible. In order to determine the bone conduction of either ear singly the usual point of application is the mastoid process. It is quite evident that there exist sound waves in the air which probably contribute a disturbing effect and result in the patient hearing by a mixture of both air and bone conduction. It is

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known that bone conduction is markedly affected in certain types of pathology whereas the air conduction may not be. On the other hand, conditions exist which result in the air conduction being markedly reduced with little or no involvement of the process of bone conduction. Thus the bone conduction is as important from a diagnostic standpoint as the air conduction.

Two important specialized tests will now be considered. The Rinne' test is carried out in the following manner: a sounding tuning fork is applied to the mastoid process and the patient asked to report the time when the sound becomes inaudible; at this time the fork is removed and the tine held in front of the ear. If the ear is normal the patient will again hear the sound. If the sound is not perceived by air conduction it is termed a negative Rinne' and shows pathology of the conducting apparatus. The second test is the so called Weber test and is carried out by application of the sounding fork somewhere in the midline of the cranium, generally at four distinct points. Clinical observations have shown that diseased conduction apparatus produces better hearing in the ipsilateral side whereas involvements of the cochlea lead to a contralateral lateralization of the tone. A 512 d.v. fork is used for the Rinne' test and a 128 d.v. fork for the Weber.

With the discovery of vacuum tubes, new instruments were made available for the testing. These instruments provided both an increased range of available frequencies and an increased range of intensities, either of which may be varied at will. Not only is this volitional variation available but also the notes are filtered so that only pure tones are used in the testing. The frequencies may be varied from approximately the lower limit of audition to the nominal upper limit. With some patients the upper limit is undoubtedly higher than may be reached by the current type of audiometer. This is, however, more of academic interest than of clinical value. The intensity of

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any frequency is controllable from a point where the average ear can not appreciate the sound, up to a degree which proves uncomfortable to the average listener. One outstanding advantage of this type of testing over that of the tuning forks is that the intensity may be maintained at any desired value; whereas, with the tuning fork any particular intensity is maintained only momentarily and the entire test must be repeated if the same intensity is to be obtained from the tuning fork a second time. Thus, if a patient does not report the time when the sound from the tuning fork has become inaudible, the test must be repeated in its entirety; whereas with the audiometer it is only necessary to increase the intensity by small amounts until the sound is again heard.

With the precision introduced by the audiometer it has been possible to obtain a more definite value of the intensity necessary to elicit the sensation of hearing in a normal ear. Further, with the large intensities that may be produced, a new fact is discovered. It is found that at sufficiently great intensity the ear ceases to have the sensation of hearing and the patient becomes conscious of pain. The threshold value of the intensity at any particular frequency is defined as the threshold of hearing. The threshold of feeling is defined as the value of the intensity at which the ear becomes conscious of pain rather than sound. Both of these thresholds are, in general, different for different frequencies. In this way one may define either of these thresholds as a function of the frequency.

If a rectangular system of coordinates be chosen for plotting these functions it is found that the two curves intersect in two places, thus enclosing a definite area. Any tone which is represented by a point lying within this area will be appreciated by the normal ear; whereas, every tone represented by a point lying outside of this area will either not be

any frequency is controllable from a point where the average ear can not appreciate the sound, up to a degree which proves uncomfortable to the average listener. One outstanding advantage of this type of hearing over that of the

hearing fork is that the intensity may be maintained at any desired value;

whereas, with the tuning fork any particular intensity is maintained only momentarily and the entire test must be repeated if the same intensity is to be obtained from the tuning fork a second time. Thus, if a patient does not report the time when the sound from the tuning fork has become inaudible,

the test must be repeated in its entirety; whereas with the audiometer it is only necessary to increase the intensity by small amounts until the sound is again heard.

With the precision introduced by the audiometer it has been possible to obtain a more definite value of the intensity necessary to elicit the sensation of hearing in a normal ear. Further, with the large intensities that

may be produced, a new fact is discovered. It is found that at sufficiently great intensity the ear ceases to have the sensation of hearing and the patient becomes conscious of pain. The threshold value of the intensity at

any particular frequency is defined as the threshold of hearing. The threshold of feeling is defined as the value of the intensity at which the ear becomes conscious of pain rather than sound. Both of these thresholds are, in general, different for different frequencies. In this way one may define either of these thresholds as a function of the frequency.

If a rectangular system of coordinates be chosen for plotting these functions it is found that the two curves intersect in two places, thus enclosing a definite area. Any tone which is represented by a point lying within this area will be appreciated by the normal ear; whereas, every tone represented by a point lying outside of this area will either not be

appreciated at all or will be sensed as feeling rather than hearing. The ordinates of this system may be chosen as the root mean square pressure of the wave, that is, proportional to the intensity; while the abscissae represent the frequency values. Plotting the curves as explained for values obtained from apparent norms, the two intersections are found to lie at about 20 and 20,000 cycles. It is interesting to note, as pointed out by Wegel, that this is the first time it has been possible to specify definitely what is meant by the limits of audition. The R.M.S. pressure expressed in dynes per square centimetre is found to vary about ten million fold from the threshold of hearing value to the threshold of feeling value in the region of greatest sensitivity. This means very unwieldy values for the ordinates.

To obviate the difficulty in dealing with such large ranges of values it becomes advantageous to use a logarithmic scale. If logarithms to the base 10 are chosen it is possible to express a ten billion fold variation as 160 of the logarithmic units. Thus these units represent, in reality, a mere ratio and not a definitive value. A convenient zero level of the logarithmic system is the ordinate representing one dyne per square centimetre. Used in this way these units are the so called decibel units which are so familiar in dealing with transmission problems in telephone engineering. The curves plotted in this system of units both vary in ordinate value with variations of the abscissae. The following figures show these curves plotted in this system of units. On the left the ordinates show R.M.S. pressure in dynes per square centimeter while on the right are the values in db. relative to one dyne per square centimetre.

It is more convenient to deal with the threshold of hearing as a straight line rather than the curved line shown above. In order to do this a new system of units very similar to the above logarithmic system is

appreciated at all or will be treated as feeling rather than hearing. The ordinates of this system may be chosen as the root mean square pressure of the wave, that is, proportional to the intensity; while the abscissa represent the frequency values. Plotting the curves as explained for values of α from 0.001 to 0.01, the two intersections are found to lie at about 20 and 25,000 cycles. It is interesting to note, as pointed out by Nagel, that this is the first time it has been possible to specify definitely what is meant by the limits of audition. The S.N.R. pressure expressed in dynes per square centimeter is found to vary about two million fold from the threshold of hearing value to the threshold of feeling value in the region of greatest sensitivity. This means very markedly values for the ordinates. To obviate this difficulty is dealing with such large ranges of values it becomes advantageous to use a logarithmic scale. It is sufficient to the base 10 are chosen it is possible to express a ten billion fold variation as 100 of the logarithmic units. Thus these units represent, in reality, a very ratio and not a definitive value. A convenient zero level of the logarithmic system is the ordinate representing one dyne per square centimeter. Used in this way these units are the so called decibel units which are so familiar in dealing with transmission problems in telephone engineering. The curves plotted in this system of units both vary in ordinate value with variations of the abscissa. The following figures show these curves plotted in this system of units. On the left the ordinates show S.N.R. pressure in dynes per square centimeter while on the right are the values in db. relative to one dyne per square centimeter.

It is more convenient to deal with the threshold of hearing as a constant line rather than the curved line shown above. In order to do this a new system of units very similar to the above logarithmic system is

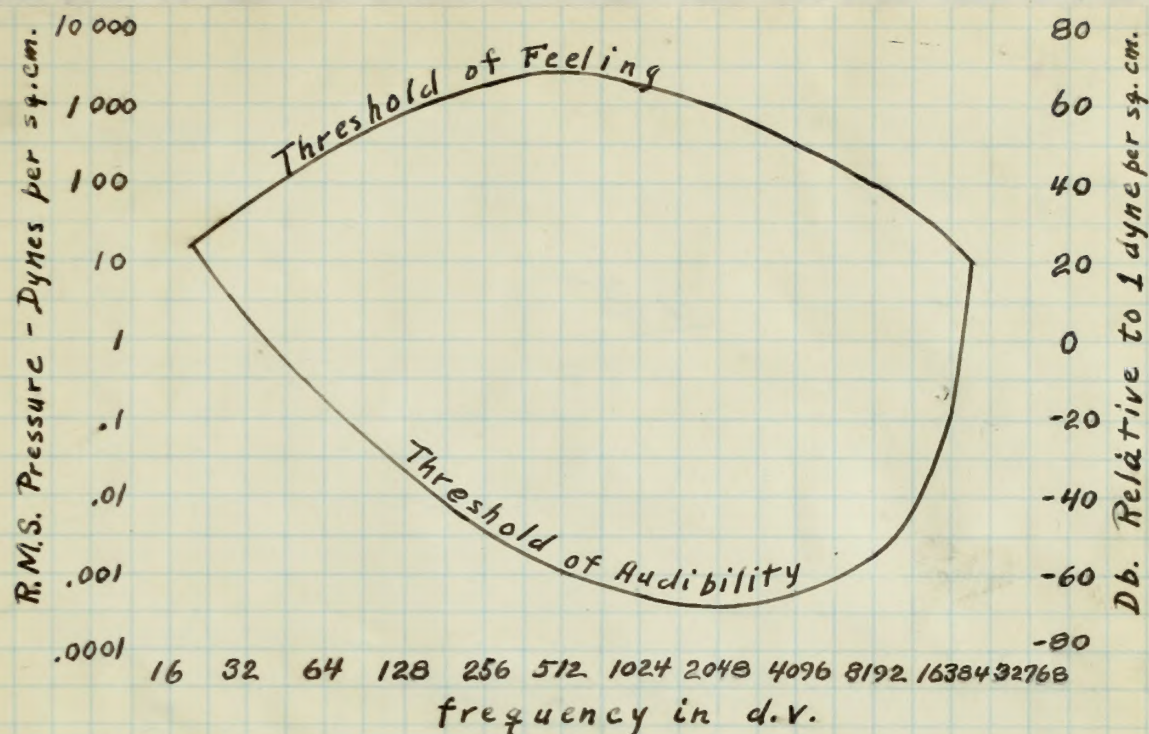


Figure 4

introduced. The zero level of this system is taken as the threshold of hearing. The units defined in this way are called sensation units. It is important to note that these units do not refer to definite physical quantities but merely express ratios of the sound intensities. The various units introduced are expressed mathematically by the following equations:

$$(17) \quad a = \log_{10} I/I_0$$

where a is expressed in bels. This unit is too large to be used conveniently so the following one is adopted:

$$(18) \quad b = 10 \log_{10} I/I_0$$

where b represents the intensity level ratio in decibels, generally termed db. The sensation unit is defined in the same way as the db. unit. Thus:

$$(19) \quad S = 10 \log_{10} I/I_0 = 20 \log_{10} P/P_0$$

where I_0 represents the threshold of intensity, that is, the intensity of

15

Figure 4

introduced. The zero level of this system is taken as the threshold of hearing. The unit defined in this way is called sensation unit. It is important to note that these units do not refer to definite physical quantities but merely express ratios of the sound intensities. The various units introduced are expressed mathematically by the following equations:

$$a = 10 \log_{10} I/I_0 \quad (17)$$

where a is expressed in bels. This unit is too large to be used conveniently so the following one is adopted:

$$b = 10 \log_{10} I/I_0 \quad (18)$$

where b represents the intensity level in decibels, commonly termed db. The sensation unit is defined in the same way as the db unit. Thus:

$$s = 10 \log_{10} I/I_0 = 10 \log_{10} P/P_0 \quad (19)$$

where I_0 represents the threshold of intensity, that is, the intensity of

sound which is barely audible to the normal ear. The right hand side of the last expression above is obvious since the intensity of a wave is proportional to the square of the pressure and in logarithmic units this is identical with multiplying by 2. The figure below shows the curve obtained using the sensation unit system.

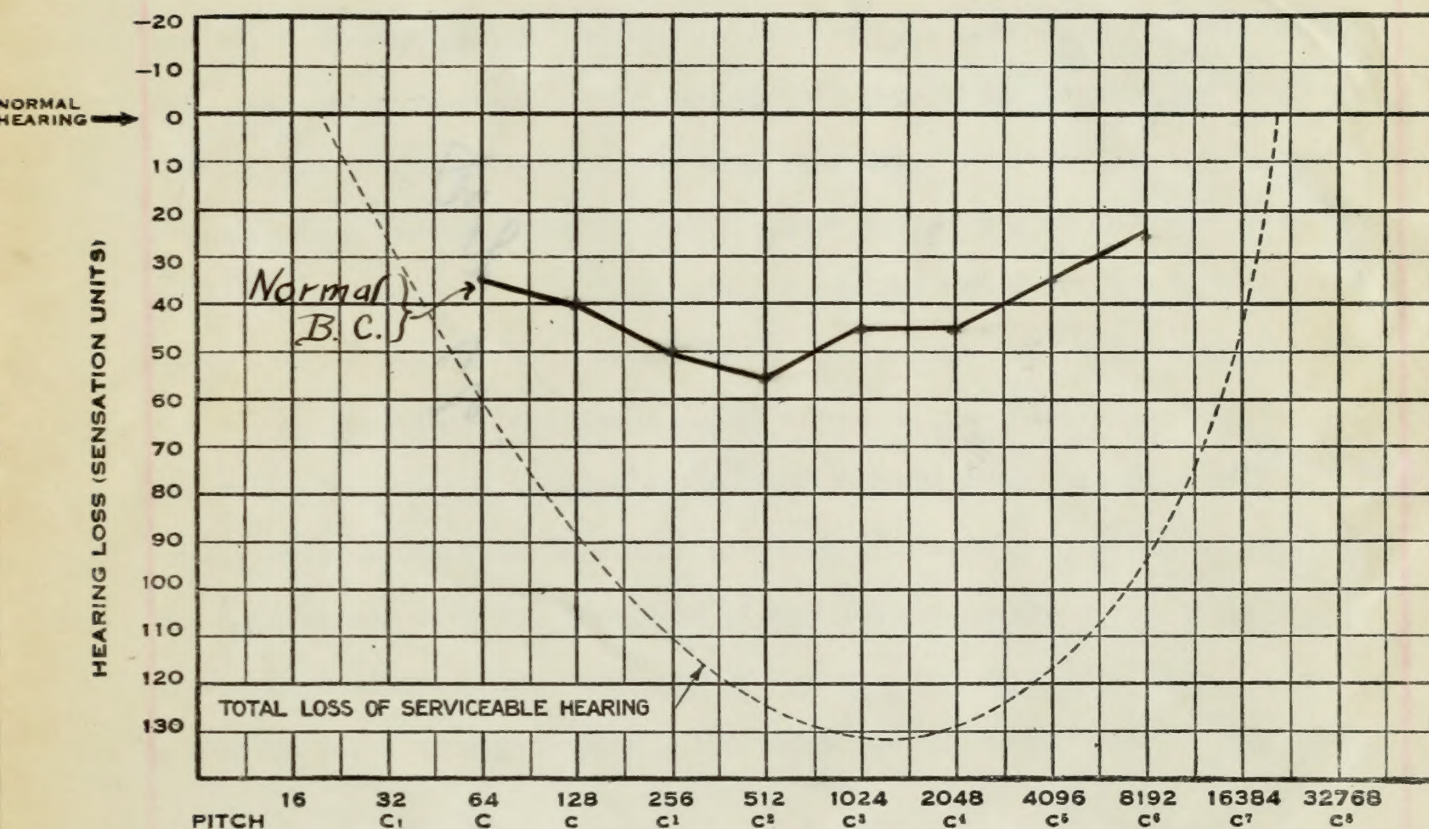


Figure 5

It should be noted that the line of normal hearing or zero sensation level represents a variation in R.M.S. pressure from approximately 0.0003 dynes per square centimetre to about 15 dynes per square centimetre. Also for convenience the scale of abscissa is logarithmic but these logarithms are to the base 2. This is usual since the octave scale of representing musical tones has long been used. In figure 5 the line labeled Total Loss

sound which is barely audible to the normal ear. The right hand side of the last expression above is obvious since the intensity of a wave is proportional to the square of the pressure and its logarithmic units this is identical with multiplying by 2. The figure below shows the curve obtained using the sensation unit system.

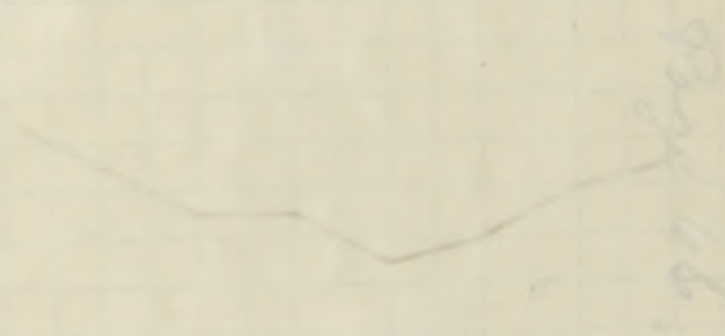


Figure 5

It should be noted that the line of normal hearing or zero sensation level represents a variation in 0.0003 pressure from approximately 0.0003 dynes per square centimeter to about 15 dynes per square centimeter. Also for convenience the scale of sensation is logarithmic but these logarithms are to the base 2. This is usual since the octave scale of representing musical tones has long been used. In figure 5 the line labeled Total loss

of Serviceable Hearing corresponds to the threshold of feeling line of Figure 4.

SECTION 2

THE AUDIOMETER USED AND THE METHOD OF TESTING

The instrument used in the research following was the Bell Telephone Laboratories' Type 1-A audiometer with calibrated headphones for air conduction and a calibrated bone conduction receiver for measuring the bone conduction. The headphones are of the moving coil type which permits the reproduction of low frequency sound. The bone conduction receiver has a wooden rod attached to a movable armature while a hard rubber tip is attached to the other end of the rod. The tip is placed against the skull and delivers the oscillatory motion to the cranial bone. The audiometer is designed to deliver a very pure wave form generated by a vacuum tube oscillator and is equipped with a calibrated attenuating network for adjusting the intensity of the tone. Frequencies from 32 c.p.s. to 16,384 c.p.s. are obtainable in steps of one-half octave with the exception of the highest octave which contains two intermediate steps. The intensity of any tone can be varied from a sub-threshold value to approximately the value for the total loss of serviceable hearing.

The following routine method was used in making the tests. If the patient was ambulatory he was placed in a comfortable chair with his back toward the audiometer. It was explained that the headphones were to be placed over his ears and that he would then hear a number of tones successively, in one ear at a time. The tones would at first be loud enough so that they might be easily heard and would then be reduced slowly until they ceased to be heard at which time he was to say "Now". The intensity was now reduced still further and then slowly increased until the sound again became barely

of Serviceable Hearing corresponds to the threshold of feeling line of Fig-

ure 4.

SECTION 2

THE AUDIOMETER USED AND THE METHOD OF TESTING

The instrument used in the research following was the Bell Telephone Laboratories' Type I-A audiometer with calibrated headphones for air conduction and a calibrated bone conduction receiver for measuring the bone conduction. The headphones are of the moving coil type which permits the reproduction of low frequency sound. The bone conduction receiver has a wooden rod attached to a movable armature while a hard rubber tip is attached to the other end of the rod. The tip is placed against the skull and Bellamy's oscillatory motion to the cranial base. The audiometer is designed to deliver a very pure wave form generated by a vacuum tube oscillator and is equipped with a calibrated attenuating network for adjusting the intensity of the tone. Frequencies from 32 c.p.s. to 16,384 c.p.s. are obtainable in steps of one-half octave with the exception of the highest octave which contains two intermediate steps. The intensity of any tone can be varied from a sub-threshold value to approximately the value for the total loss of serviceable hearing.

The following routine method was used in making the tests. If the patient was ambulatory he was placed in a comfortable chair with his back toward the audiometer. It was explained that the headphones were to be placed over his ears and that he would then hear a number of tones successively, in one ear at a time. The tones would at first be loud enough so that they might be easily heard and would then be reduced slowly until they ceased to be heard at which time he was to say "low". The intensity was now reduced still further and then slowly increased until the sound again became barely

audible at which time he was again to say "Now". With a number of patients it is necessary to constantly remind them of what they are expected to do. If the value for which the sound is lost differs from that for which it is first heard by more than 5 db. the test is repeated for that frequency. In general the two intensities will coincide or the value for increasing intensity will be reported 5 db. lower than the value for decreasing intensity. The 5 db. step is the smallest frequency change possible on this instrument but is sufficiently accurate in dealing with pathologic cases. A number of audiograms have been taken which were discarded because it was believed discrepancies existed in them. In making a gram, if any frequency be repeated after a short period of time and the threshold found to differ by more than 5 db. from the value previously obtained, it was obvious that the patient was not co-operating and the values could not be relied upon.

The bone conduction was tested for either ear by applying the bone conduction receiver to the tip of the mastoid process. The threshold was obtained only for decreasing intensity. Following the determination of bone conduction for frequencies for 64 c.p.s. to 8,192 c.p.s. in steps of one octave each, the frequency was set at 128 c.p.s. and the Weber determined by applying the vibrator to four points of the skull. It was found that the Weber was lateralized in a number of cases due to impacted wax so that early in the series an otoscopic examination was instituted. Thus, the Webers reported are not due to artefact.

SECTION 3

CASE REPORTS

The following pages are devoted to the cases presented in this study. The medical history and hospital findings have been reduced from the regular hospital records and are as concise as possible.

audible at which time he was again to say "Now" with a number of patients it is necessary to constantly remind them of what they are expected to do. If the value for which the sound is just different from that for which it is first heard by some than 5 db. the test is repeated for that frequency. In general the two intensities will coincide or the value for increasing intensity will be reported 5 db. lower than the value for decreasing intensity. The 5 db. step in the smallest frequency change possible on this instrument but is sufficiently accurate in dealing with psychologic cases. A number of audiograms have been taken which were discarded because it was believed that organization existed in them. In making a guess, if any frequency be repeated after a short period of time and the threshold found to differ by more than 5 db. from the value previously obtained, it was obvious that the patient was not co-operating and the values could not be relied upon.

The bone conduction was tested for either ear by applying the bone conduction receiver to the tip of the mastoid process. The threshold was obtained only for decreasing intensity. Following the determination of bone conduction for frequencies for 64 c.p.s. to 5,102 c.p.s. in steps of one octave each, the frequency was set at 128 c.p.s. and the Weber determined by applying the vibrator to four points of the skull. It was found that the Weber was lateralized in a number of cases due to expected ear so that only in the cases an otoscopic examination was instituted. Thus, the Weber report is not due to artifact.

SECTION 3

CASE REPORTS

The following pages are devoted to the cases presented in this study. The medical history and hospital findings have been reduced from the regular hospital records and are as complete as possible.

Massachusetts Memorial Hospitals

69

EVANS MEMORIAL

AUDIOGRAM

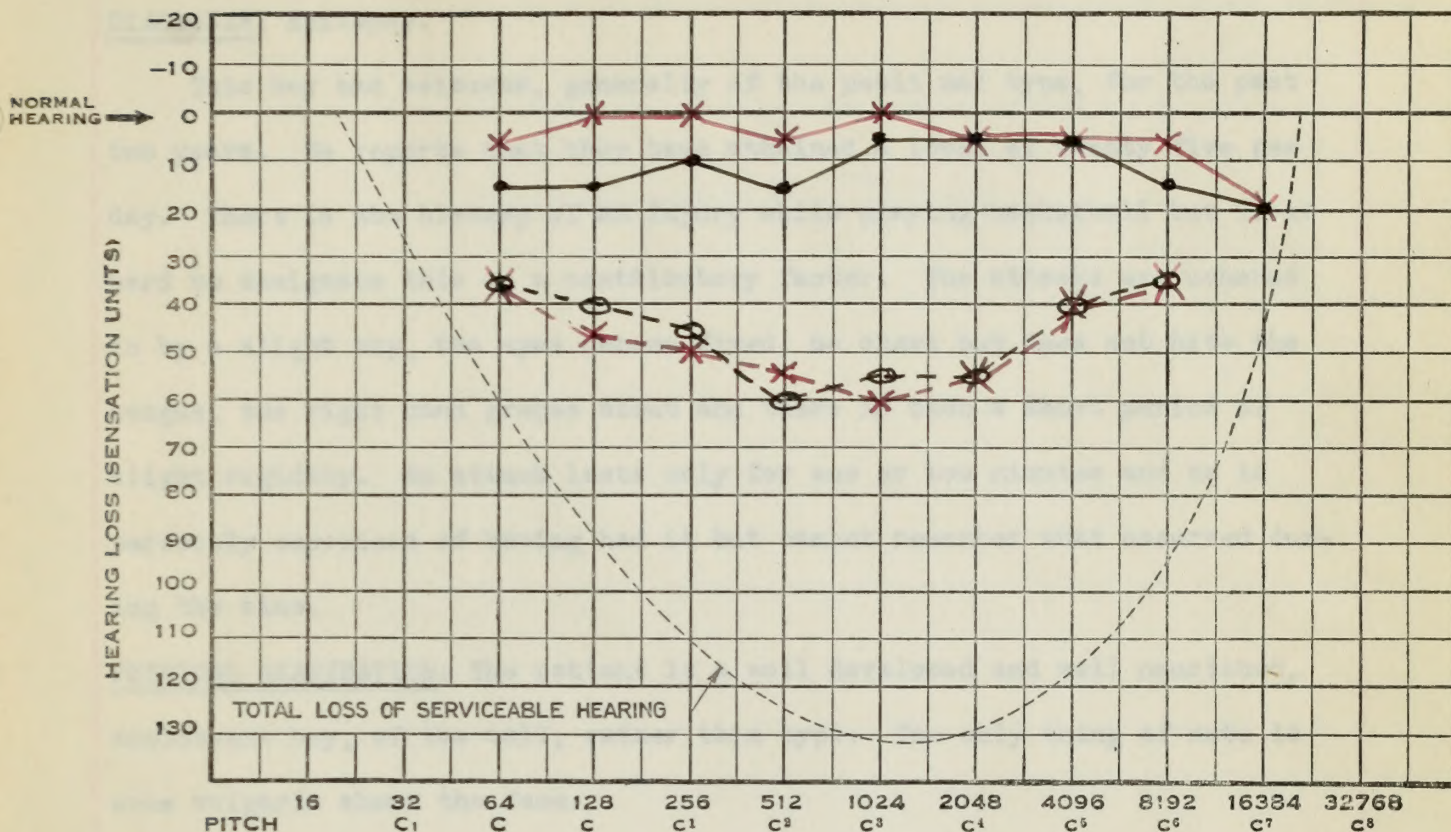
NAME

W. G. 725/22.

DATE

12/6

19 32

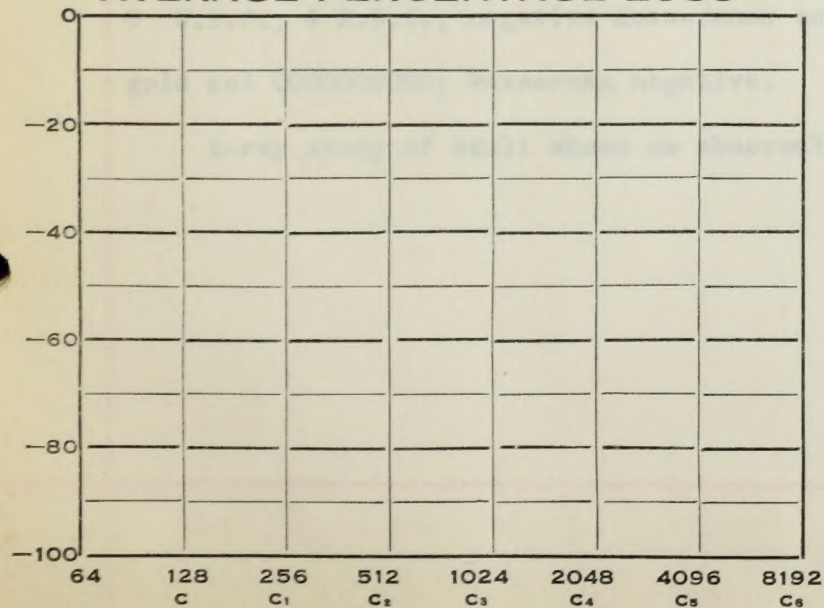


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

W...C...; #725,122; Male; Age 17; White; Single.

DIAGNOSIS: Epilepsy.

This boy had seizures, generally of the petit mal type, for the past two years. He reports that they have attained a level of twenty five per day. There is the history of an injury while playing basketball but it is hard to designate this as a contributory factor. The attacks are ushered in by a slight cry, the eyes become fixed, he chews but does not bite the tongue, the right hand gropes about and there is then a short period of slight rigidity. An attack lasts only for one or two minutes and he is perfectly conscious of having had it but cannot remember what occurred during the time.

PHYSICAL EXAMINATION: The patient is a well developed and well nourished, adolescent boy, of the tall, rather thin type. The only thing of note is acne vulgaris about the face.

NEUROLOGICAL EXAMINATION: He reacts very slowly but is of normal mentality. Speech is rather slow and drawling. There is a slight sinus arrhythmia.

URINE: Yellow; alkaline; sp. gr. 1020; no sugar nor albumen.

BLOOD: 85% Hgb.; 4,350,000 R.B.C.; 7,000 W.B.C.; pressure 110/70.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 10 cc. removed; F.P. 70; 0 W.B.C.; 4 R.B.C.; negative Ross-Jones and Pandy; protein 46 mg/100 cc.; gold sol 0000000000; Wasserman negative.

X-ray study of skull shows no abnormalities.

W...C...; 4426,122; male; age 17; white; single.

DIAGNOSIS: Epilepsy.

This boy had seizures, generally of the petit mal type, for the past two years. He reports that they have attained a level of twenty five per day. There is the history of an injury while playing basketball but it is hard to designate this as a contributory factor. The attacks are ushered in by a slight cry, the eyes become fixed, he chews but does not bite the tongue, the right hand gropes about and there is then a short period of slight rigidity. An attack lasts only for one or two minutes and he is perfectly conscious of having had it but cannot remember what occurred during the time.

PHYSICAL EXAMINATION: The patient is a well developed and well nourished, adolescent boy, of the tall, rather thin type. The only thing of note is some vulgaris about the face.

NEUROLOGICAL EXAMINATION: He reacts very slowly but is of normal mentality. Speech is rather slow and droning. There is a slight sinus arrhythmia.

URINES: Yellow; alkaline; sp. gr. 1020; no sugar nor albumen.

BLOOD: 854 Rbc.; 4,350,000 R.B.C.; 7,000 W.B.C.; pressure 110/70.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 10 cc. removed; 3.7. 70;

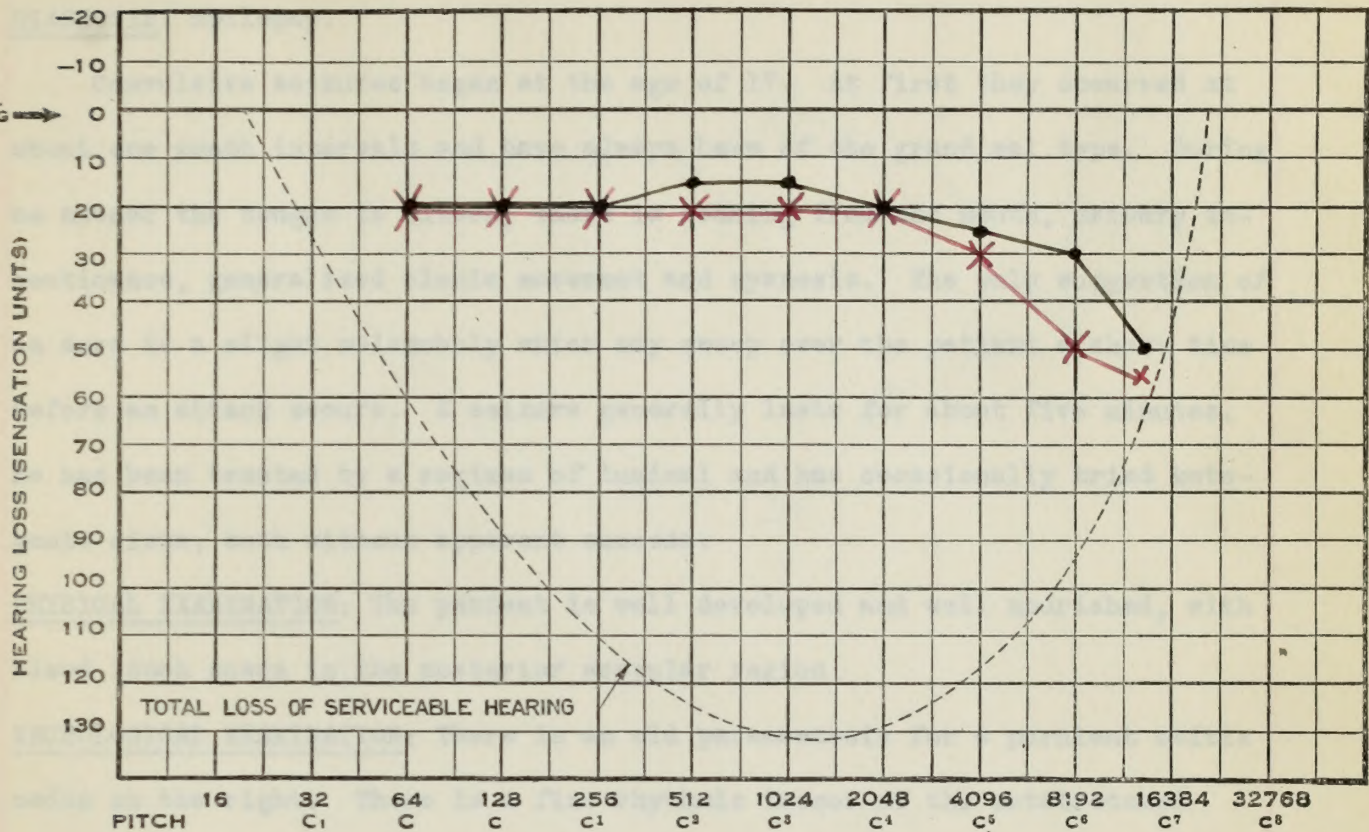
0 W.B.C.; 4 R.B.C.; negative Ross-Jones and Pandey; protein 48 mg/100 cc.;

Gold sol 0000000000; Wasserman negative.

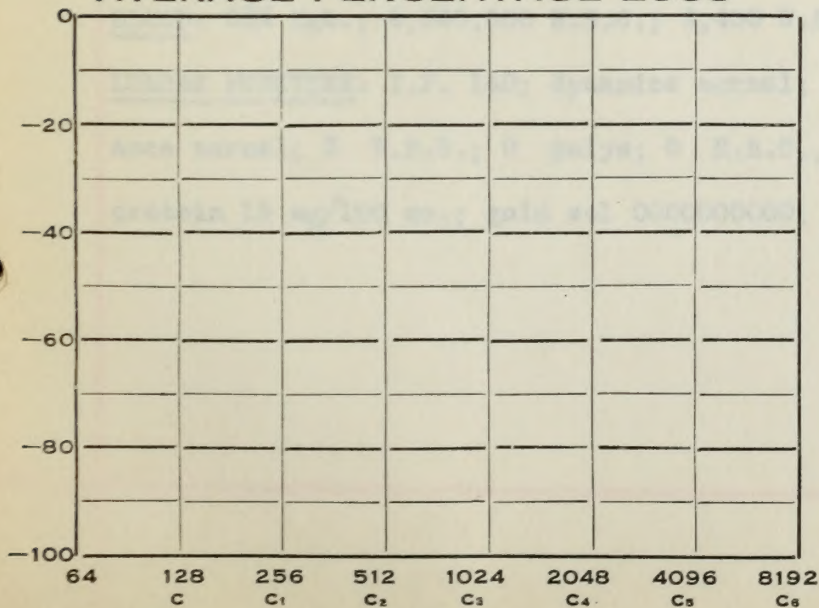
X-ray study of skull shows no abnormalities.

EVANS MEMORIAL

71

AUDIOGRAM
 NAME A.W. 724 947
 DATE 10/13 19 34


Bone Conduction not Recorded.

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right Left

Rinne AC

BC

Weber

Upper Limit.....

Lower Limit.....

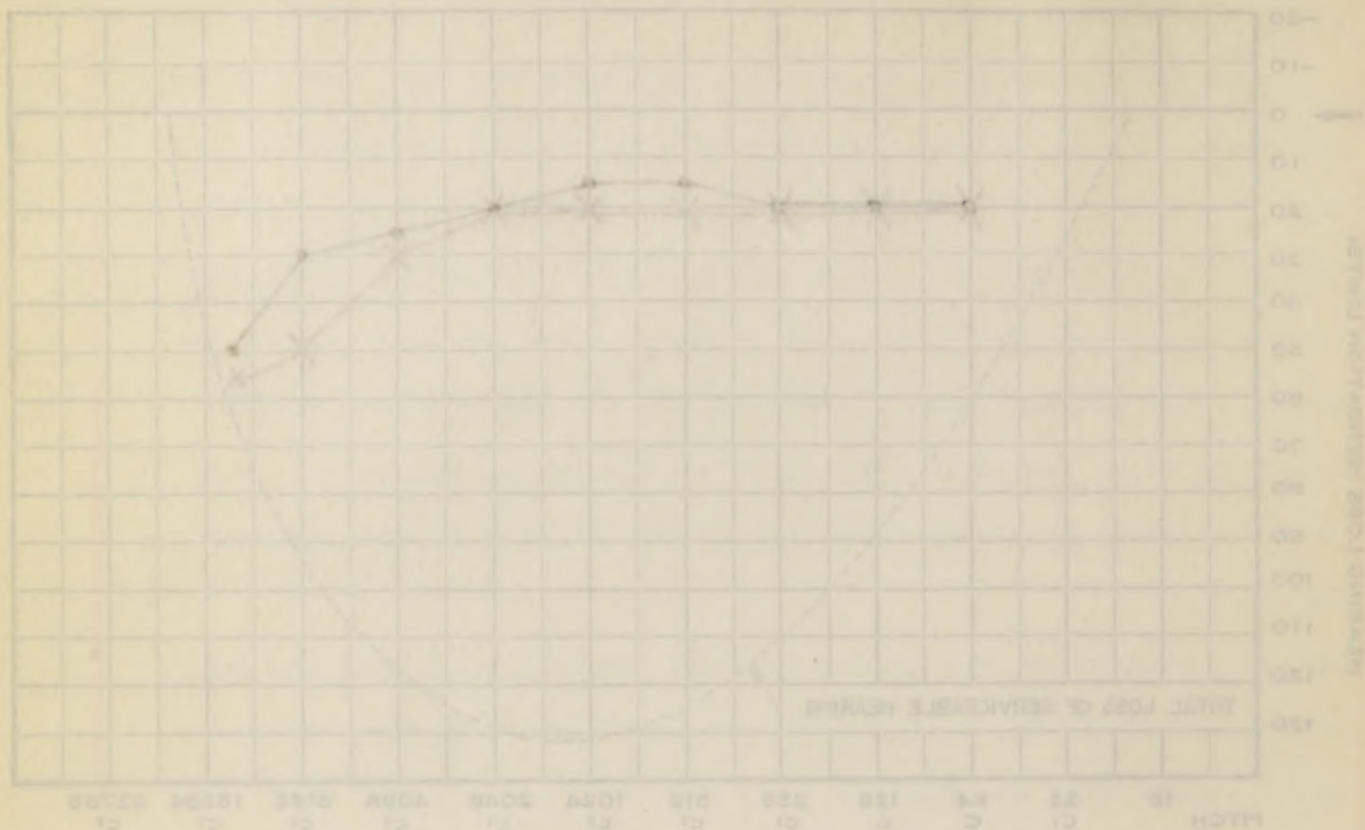
Whisper.....

Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME O. W.
DATE 10/11/34



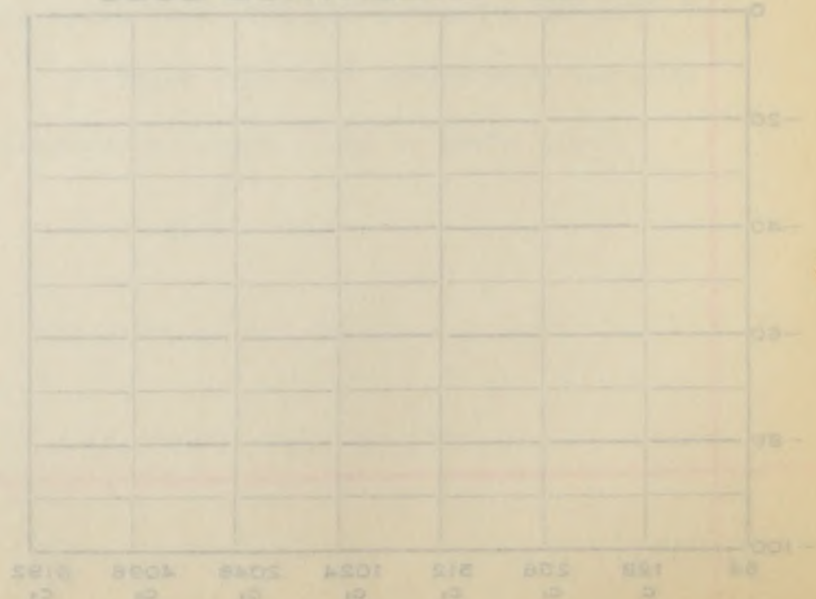
Frequency Hearing Test

Right Ear

Left Ear

Bone Conduction not recorded.

AVERAGE PERCENTAGE LOSS



Distance

Distance

Chief Complaint

1. Deafness

2. Tinnitus

3. Headache

4. Dizziness

5. Vertigo

6. Other

Right

Left

Distance

Distance

Distance

Distance

Distance

Distance

Distance

A...W...; #724,947; Male; Age 26; White; Single.

DIAGNOSIS: Epilepsy.

Convulsive seizures began at the age of 17. At first they occurred at about one month intervals and have always been of the grand mal type. During an attack the tongue is bitten, there is foaming from the mouth, urinary incontinence, generalized clonic movement and cyanosis. The only suggestion of an aura is a slight melancholy which may sweep over the patient a short time before an attack occurs. A seizure generally lasts for about five minutes. He has been treated by a regimen of luminal and has occasionally tried ketogenic diets, both without apparent success.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, with blood leech scars in the posterior scapular region.

NEUROLOGICAL EXAMINATION: There is an old paracentesis for a purulent otitis media on the right. There is a fine rhythmic tremor of the outstretched hands, of the eyelids and of the protruded tongue. The right pupil is smaller than the left and both react sluggishly to light and accommodation. There is a generalized hyperreflexia, left greater than right, with bilateral patellar and ankle clonus. X-ray study of the skull shows no abnormalities.

URINE: Yellow; acid; sp. gr. 1016; no sugar nor albumen.

BLOOD: 85% Hgb.; 4,640,000 R.B.C.; 8,400 W.B.C.; Kahn negative; pr. 130/70.

LUMBAR PUNCTURE: I.P. 140; dynamics normal; 15 cc. removed; F.P. 70; appearance normal; 3 W.B.C.; 0 polys; 0 R.B.C., no Ross-Jones nor Pandy; protein 19 mg/100 cc.; gold sol 0000000000; Wasserman negative.

A...W...; 4724, 947; Male; Age 28; White; Single.

DIAGNOSIS: Epilepsy.

Convulsive seizures began at the age of 17. At first they occurred at about one month intervals and have always been of the grand mal type. During an attack the tongue is bitten, there is foaming from the mouth, urinary incontinence, generalized clonic movement and cyanosis. The only suggestion of an aura is a slight calmness which may sweep over the patient a short time before an attack occurs. A seizure generally lasts for about five minutes. He has been treated by a regimen of luminal and has occasionally tried keto-genic diets, both without apparent success.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, with blood vessel scars in the posterior scapular region.

NEUROLOGICAL EXAMINATION: There is an old paracentesis for a purulent otitis media on the right. There is a fine rhythmic tremor of the outstretched hands, of the eyelids and of the protruded tongue. The right pupil is smaller than the left and both react sluggishly to light and accommodation. There is a generalized hyperreflexia, left greater than right, with bilateral Babinski and ankle clonus. X-ray study of the skull shows no abnormalities.

URINE: Yellow; acid; sp. gr. 1.018; no sugar nor albumen.

BLOOD: Hgb.: 4,840,000 R.B.C.: 8,400 W.B.C.: Kahn negative; ur. 130/70.

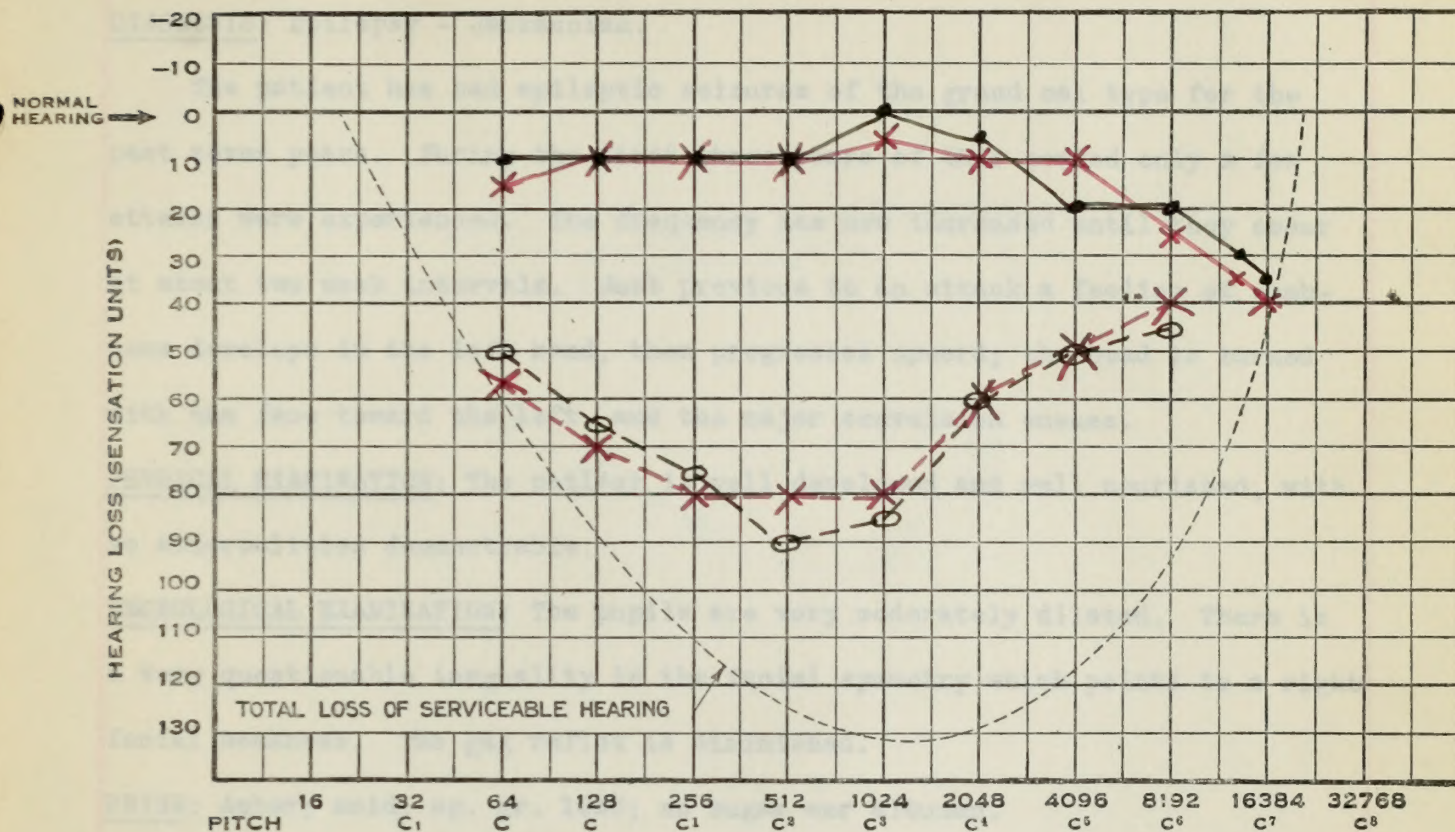
LUMBAR PUNCTURE: I.P. 140; dynamics normal; 15 cc. removed; F.P. 70; appearance normal; 5 W.B.C.; 0 polya; 0 R.B.C.; no Ross-Jones nor Pandey;

protein 12 mg/100 cc.; Gold sol 000000000; Wassermann negative.

EVANS MEMORIAL

73

AUDIOGRAM

NAME R.B. 732 149
DATE Dec 14 1933

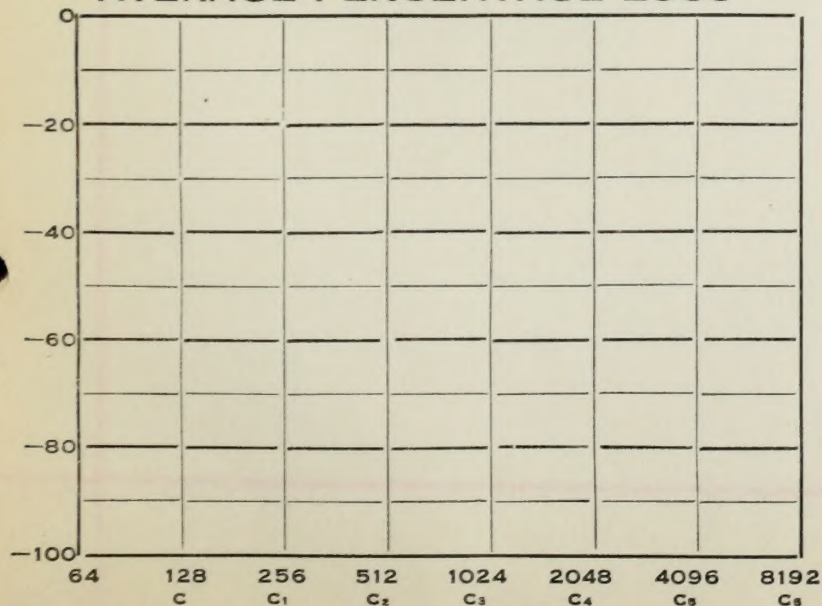
Percentage Hearing Loss

Right Ear

Left Ear

Weber = { Vertex
Nose Bridge
Chin
Right on Forehead.

AVERAGE PERCENTAGE LOSS



Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

RightLeft

Rinne AC

BC

Weber

Upper Limit.....

Lower Limit.....

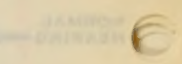
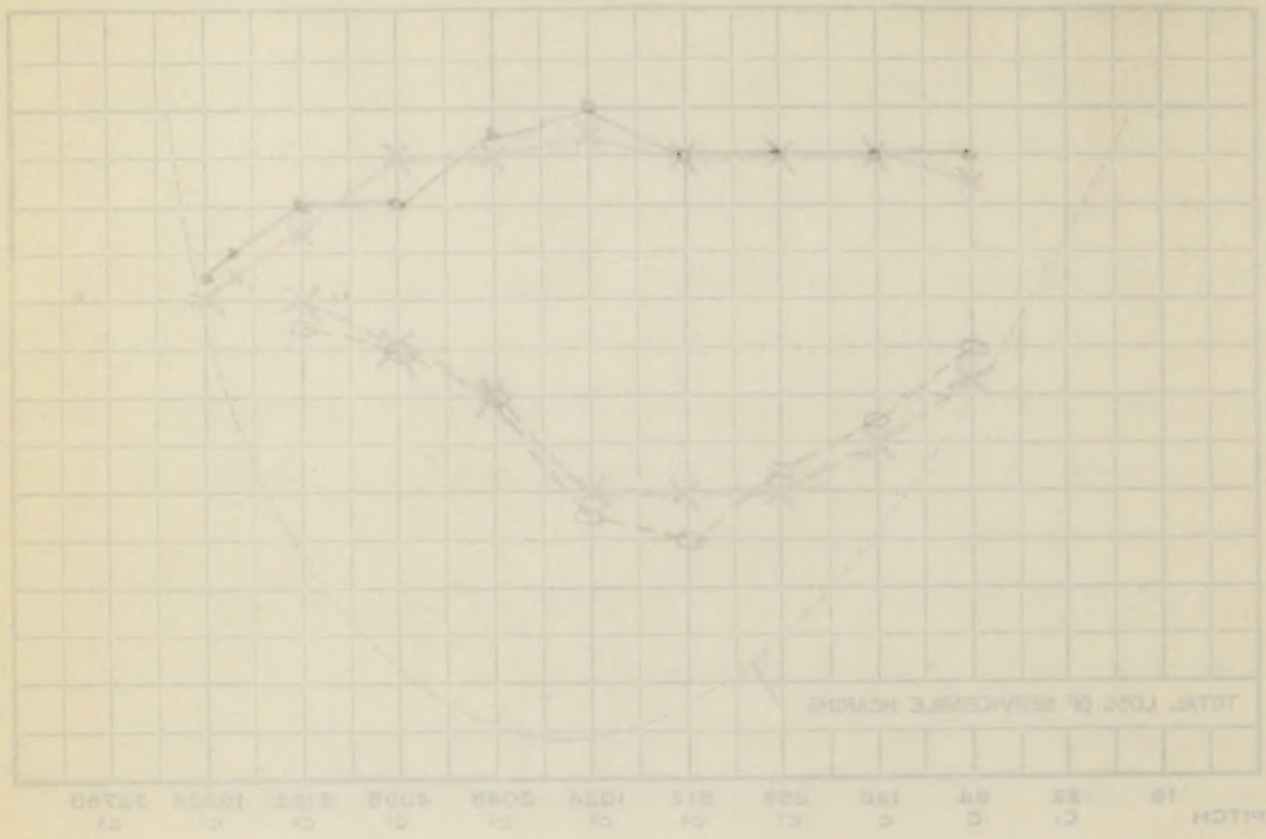
Whisper.....

Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME: R.B. 732 149
 DATE: Dec 14 1932

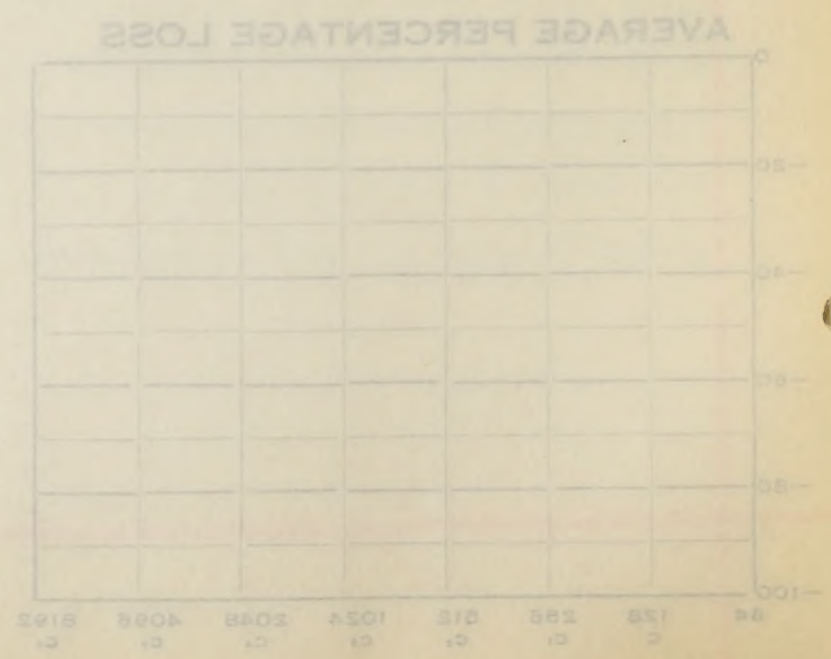


PERCENTAGE HEARING LOSS

TOTAL LOSS OF SERVICEABLE HEARING

Percentage Hearing Loss
 Right Ear
 Left Ear

Right on forehead
 Weber = { Vertex
 Nose Bridge
 Chin



Diagnosis
 History
 Chief Complaint
 1. Tinnitus
 2. Deafness
 3. Headache
 4. Vertigo
 5. Nausea
 6. Dizziness

Notes:
 Weber AC
 Weber
 Upper Limit
 Lower Limit
 Weber
 Weber

R...G...B...; #732,149; Male; Age 25; White; Single.

DIAGNOSIS: Epilepsy - Jacksonian.

The patient has had epileptic seizures of the grand mal type for the past seven years. During the first three years of this period only a few attacks were experienced. The frequency has now increased until they occur at about two week intervals. Just previous to an attack a feeling of numbness develops in the left hand, then progresses upward; the head is turned with the face toward the left, and the major convulsion ensues.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, with no abnormalities demonstrable.

NEUROLOGICAL EXAMINATION: The pupils are very moderately dilated. There is a very questionable inequality in the facial symmetry which points to a right facial weakness. The gag reflex is diminished.

URINE: Amber; acid; sp. gr. 1026; no sugar nor albumen.

BLOOD: 89% Hgb.(S); 4,950,000 R.B.C.; 11,200 W.B.C.; N.P.N. 23; B.S. 77; Kahn negative; pressure 105/80;

LUMBAR PUNCTURE: I.P. 90; dynamics normal; 8 cc. removed; F.P. 0; appearance normal; 2 W.B.C.; 0 R.B.C.; no Ross-Jones nor Pandy; protein 50 mg/100cc gold sol 0000000000; Wasserman negative.

AVERAGE PERCENTAGE LOSS

...G...B...; 4732, 142; Male; Age 25; White; Single.

DIAGNOSIS: Epilepsy - Jacksonian.

The patient has had epileptic seizures of the Grand mal type for the past seven years. During the first three years of this period only a few attacks were experienced. The frequency has now increased until they occur at about two week intervals. Just previous to an attack a feeling of numbness develops in the left hand, then progresses upward; the head is turned with the face toward the left, and the major convulsion ensues.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, with no abnormalities demonstrable.

NEUROLOGICAL EXAMINATION: The pupils are very moderately dilated. There is a very questionable inequality in the facial symmetry which points to a right facial weakness. The gag reflex is diminished.

URINE: Amber; acid; sp. gr. 1024; no sugar nor albumen.

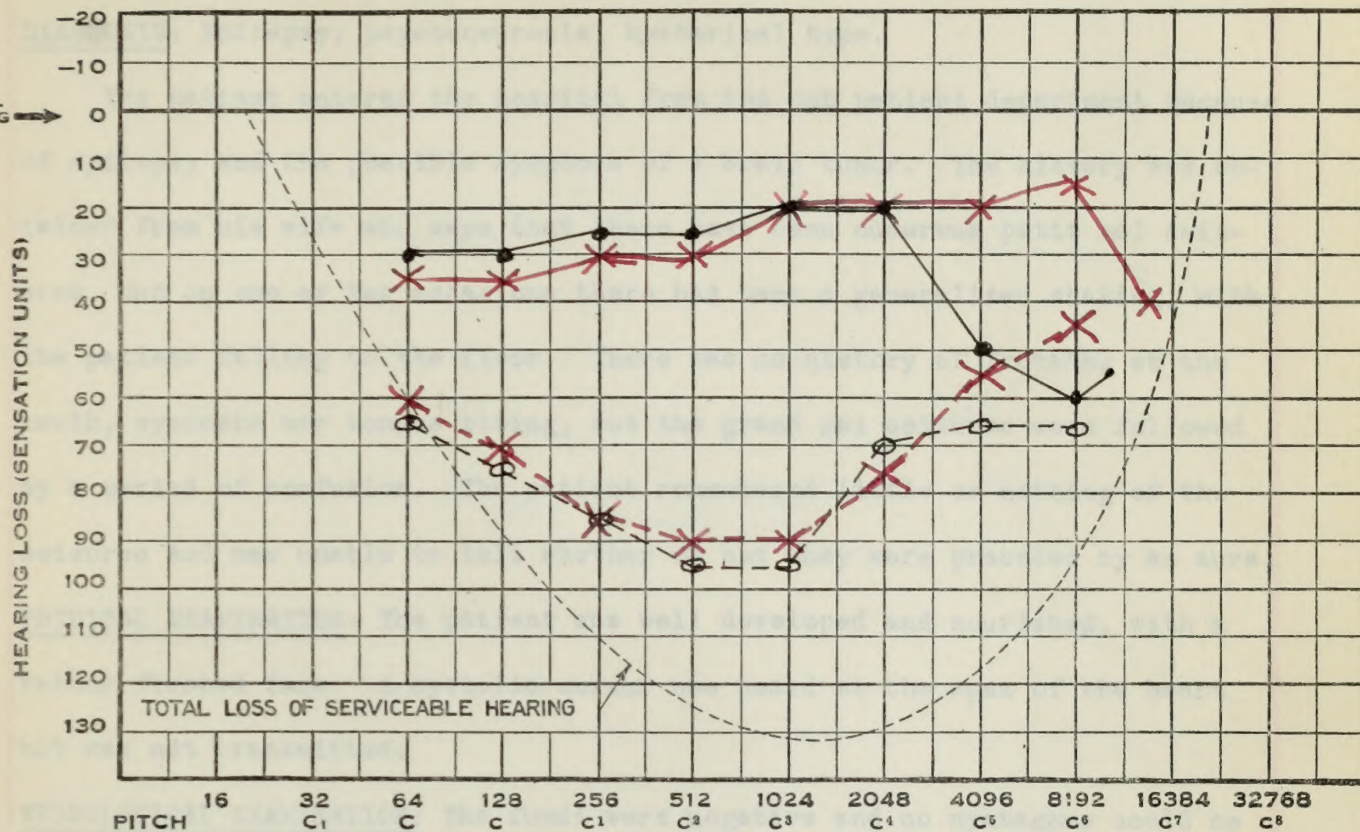
BLOOD: Hgb. 82 (s); 4,850,000 R.B.C.; 11,200 W.B.C.; 4.4% E.S. 77;

Kidney negative; pressure 105/80;

THYROID FUNCTION: I.P. 30; dynamics normal; 8 cc. removed; F.P. 0; appear-

ance normal; 2 W.B.C.; 0 E.B.C.; no Ross-Jones nor Pandey; protein 50 mg/100m

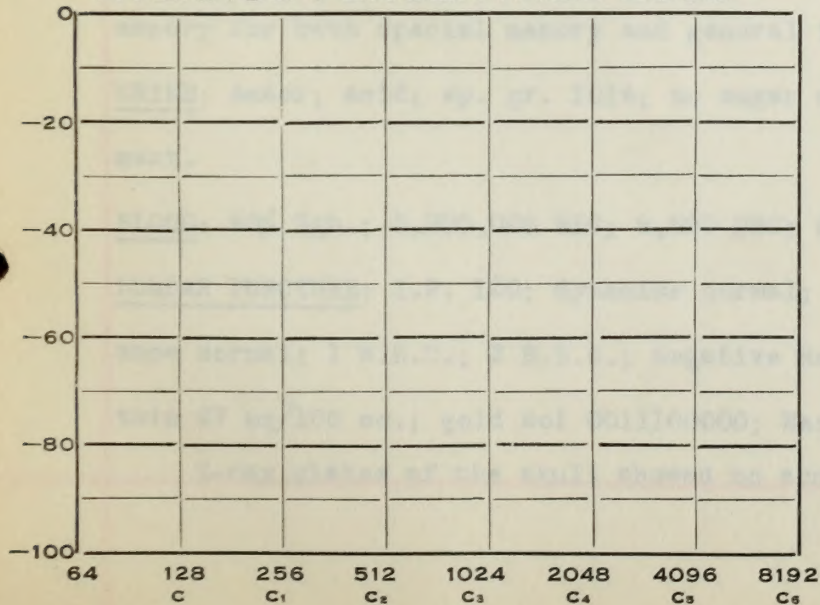
Gold sol 000000000; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**NAME J.M.D. 743350
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber Left { Vertex
Forehead
= { Nose bridge
Chin.

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain
3. Discharge.....
4. Tinnitus
5. Headache
6. Dizziness

Right Left

Rinne AC BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

J... M... D...; #743,350; Male; Age 39; White; Married.

DIAGNOSIS: Epilepsy; psychoneurosis, hysterical type.

The patient entered the hospital from the out patient department because of epilepsy and the possible symptoms of a brain tumor. The history was obtained from his wife who says that there have been numerous petit mal seizures, but on one or two occasions there has been a generalized shaking, with the patient falling to the floor. There was no history of frothing at the mouth, cyanosis nor tongue biting, but the grand mal seizures were followed by a period of confusion. The patient remembered little or nothing of the seizures and was unable to tell whether or not they were preceded by an aura.

PHYSICAL EXAMINATION: The patient was well developed and nourished, with a rather flushed face. A systolic murmur was heard at the apex of the heart but was not transmitted.

NEUROLOGICAL EXAMINATION: The fundi were negative and no nystagmus could be obtained. The gag reflex was diminished but not absent, while movements of the palate were somewhat less than normal. There was some weakness of the flexors of the thighs and the left knee jerk was slightly greater than the right, but apparently within normal limits. The abdominal reflexes were present but were easily fatigued. The mental status showed considerable loss of memory for both special memory and general information.

URINE: Amber; acid; sp. gr. 1014; no sugar nor albumen; some debris in sediment.

BLOOD: 96% Hgb.; 5,000,000 RBC; 9,800 WBC; Kahn negative; pressure 120/80.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 10 cc. removed; F.P. 70; appearance normal; 1 W.B.C.; 2 R.B.C.; negative Ross-Jones; positive Pandy; protein 27 mg/100 cc.; gold sol 0011100000; Wasserman negative.

X-ray plates of the skull showed no abnormalities.

J... M... D... : 4745, 300; Male; Age 30; White; Married.

DIAGNOSIS: Epilepsy; psychomotoric, hysterical type.

The patient entered the hospital from the out-patient department because of epilepsy and the possible diagnosis of a brain tumor. The history was obtained from his wife who says that there have been numerous petit mal seizures, but on one or two occasions there has been a generalized attack, with the patient falling to the floor. There was no history of frothing at the mouth, cyanosis nor tongue biting, but the grand mal seizures were followed by a period of confusion. The patient remembered little or nothing of the seizures and was unable to tell whether or not they were preceded by an aura.

PHYSICAL EXAMINATION: The patient was well developed and nourished, with a rather flushed face. A systolic murmur was heard at the apex of the heart but was not transmitted.

NEUROLOGICAL EXAMINATION: The fundi were negative and no nystagmus could be obtained. The gag reflex was diminished but not absent, while movements of the palate were somewhat less than normal. There was some weakness of the flexors of the thighs and the left knee jerk was slightly greater than the right, but apparently within normal limits. The abdominal reflexes were present but were easily fatigued. The mental status showed considerable loss of memory for both special memory and general information.

URINE: Acid; solid; sp. gr. 1.014; no sugar nor albumen; some debris in sediment.

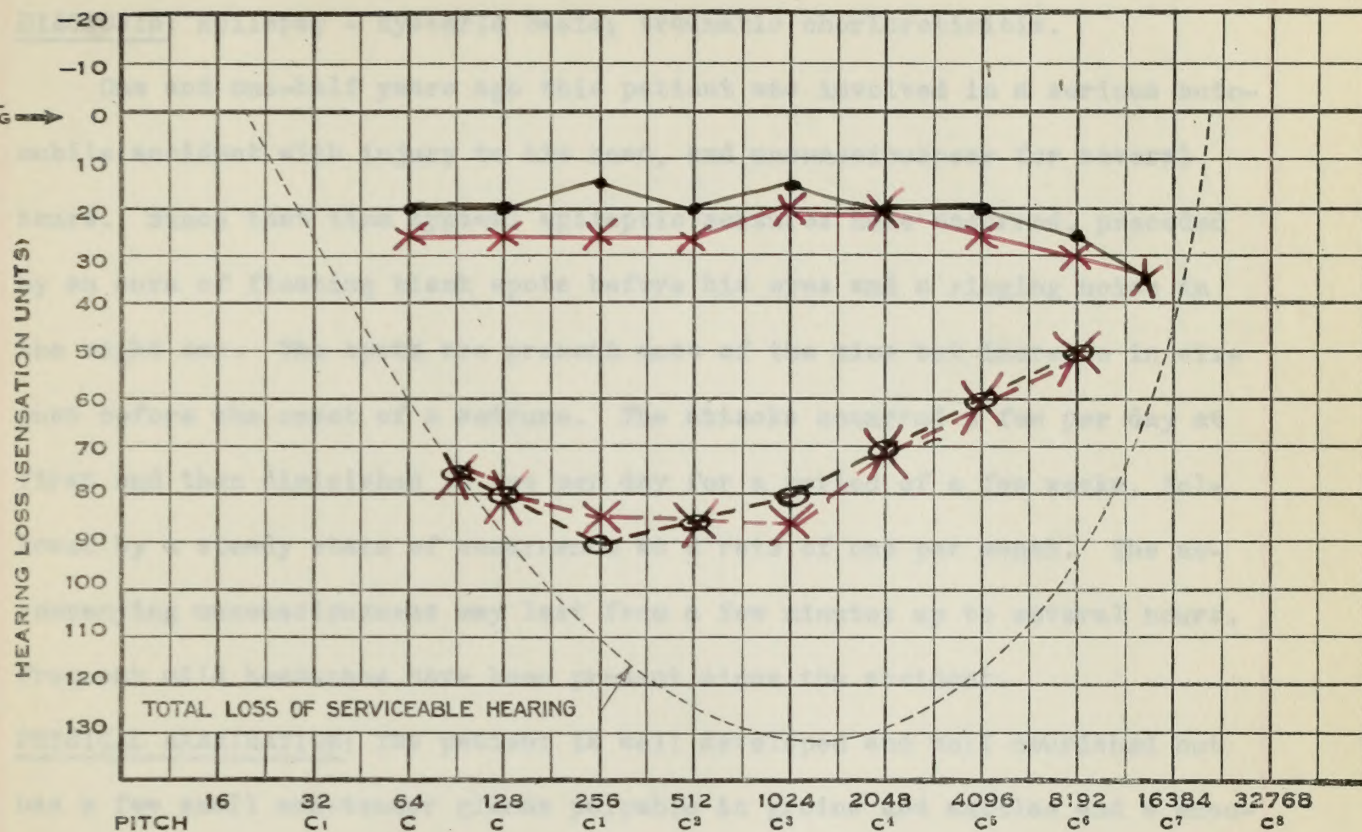
BLOOD: 95% Hgb.; 5,000,000 RBC; 5,800 WBC; Kahn negative; pressure 120/80.

PULSAR FUNCTION: I.P. 120; dynamometer normal; IO cc. removed; F.P. 70; appearance normal; I.R.B.C.; 2 R.B.C.; negative Rose-Jones; positive Pandy; protein 27 mg/100 cc.; gold sol G011100000; Wassermann negative.

X-ray plates of the skull showed no abnormalities.

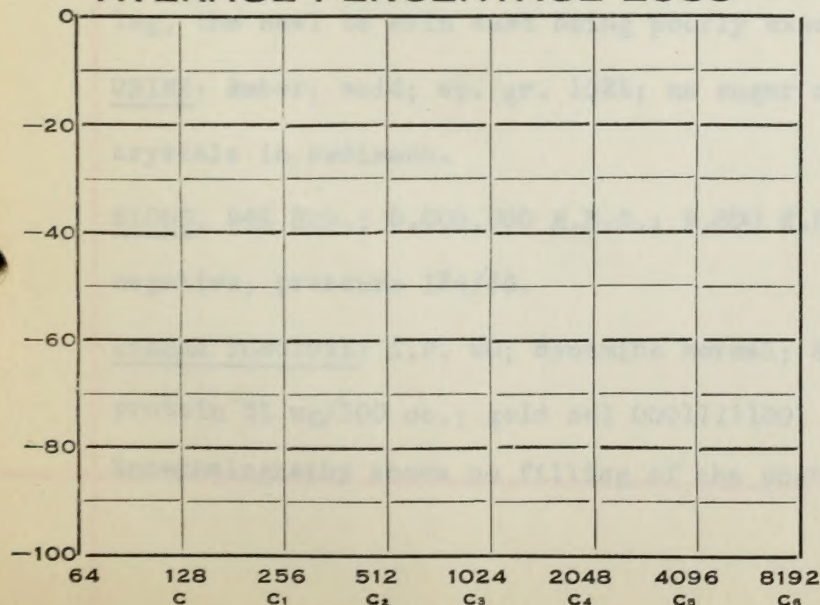
EVANS MEMORIAL

AUDIOGRAM

 NAME A. R. 745027
 DATE 3-26 19 54


Weber left 4 points

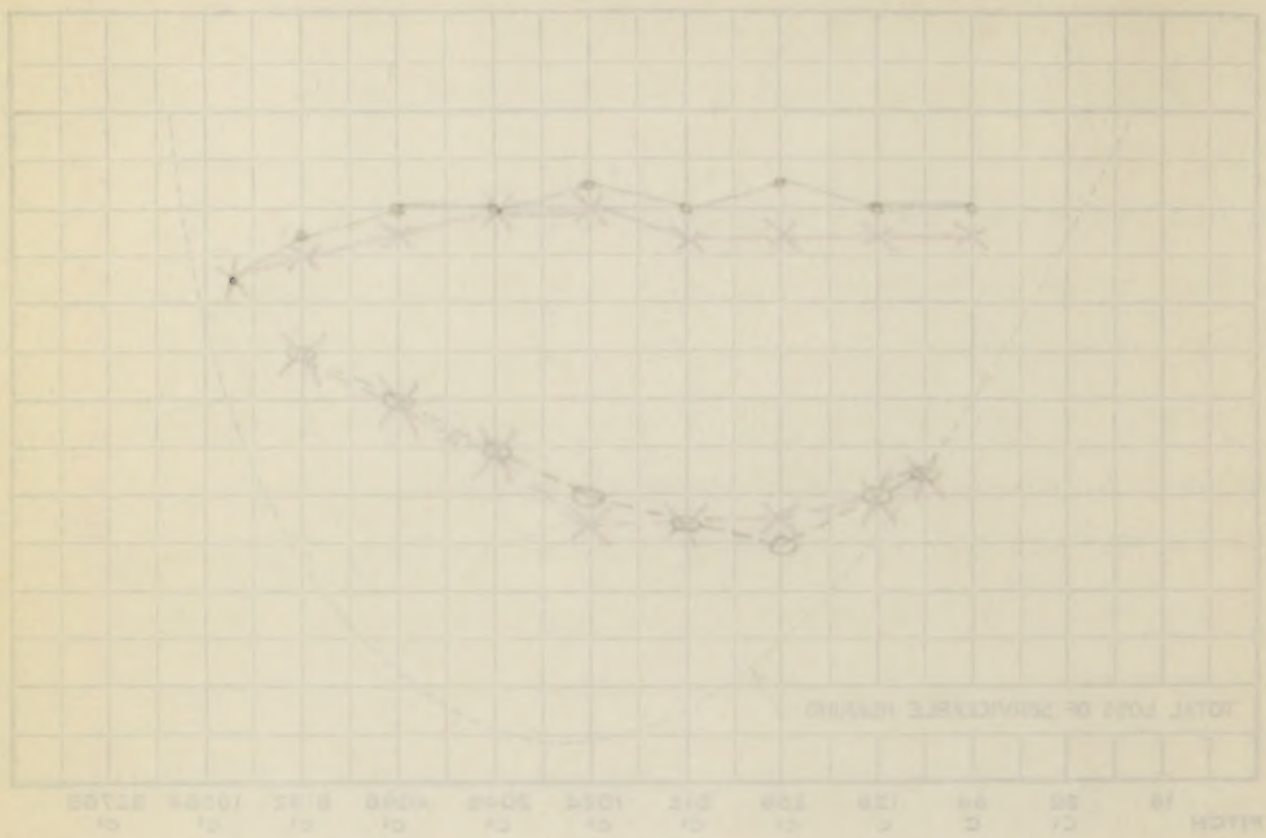
AVERAGE PERCENTAGE LOSS


 Disease
 Duration
 Chief Symptom.....
 1. Deafness
 2. Pain
 3. Discharge
 4. Tinnitus
 5. Headache
 6. Dizziness
 Right Left
 Rinne AC
 BC
 Weber
 Upper Limit.....
 Lower Limit.....
 Whisper.....
 Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME A. R. 242027
DATE 3 14 19 14



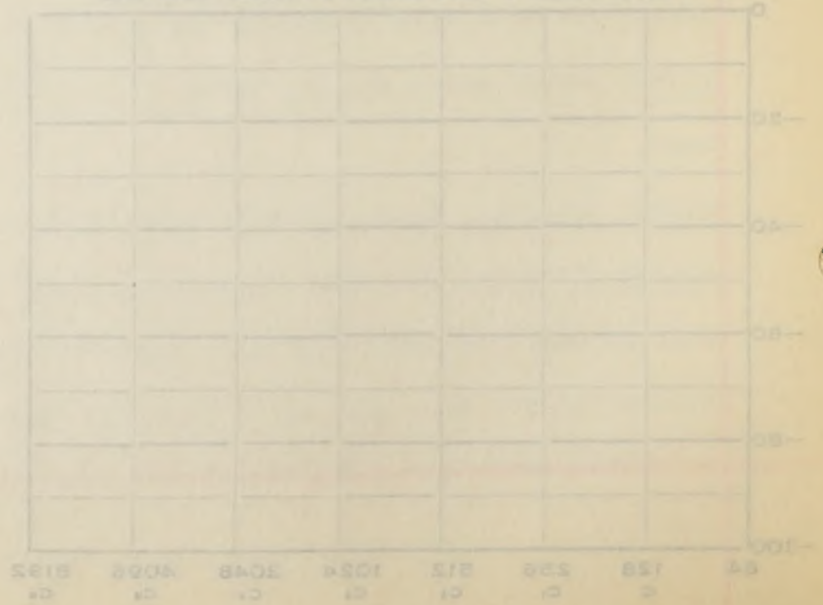
Right Ear
Left Ear
Average

TOTAL LOSS OF SERVICEABLE HEARING

Percentage Hearing Loss
Right Ear
Left Ear

Weber left 4 points

AVERAGE PERCENTAGE LOSS



Diagnosis
Duration
Chief Complaint
1. History
2. Present
3. Discharge
4. Treatment
5. Results
6. Remarks
Left
Right
Notes

EVANS MEMORIAL

A...R...; #745,027; Male; Age 21; White; Single.

DIAGNOSIS: Epilepsy - hysteria basis; traumatic chorioretinitis.

One and one-half years ago this patient was involved in a serious automobile accident with injury to his head, and unconsciousness for several hours. Since that time typical epileptic seizures have occurred, preceded by an aura of floating black spots before his eyes and a ringing noise in the right ear. The spots are present most of the time but increase in size just before the onset of a seizure. The attacks occurred a few per day at first and then diminished to one per day for a period of a few weeks, followed by a steady state of occurrence at a rate of one per month. The accompanying unconsciousness may last from a few minutes up to several hours. Frequent mild headaches have been present since the accident.

PHYSICAL EXAMINATION: The patient is well developed and well nourished but has a few small non-tender glands palpable in groins and axillae and a mucopurulent discharge in the pharynx.

NEUROLOGICAL EXAMINATION: There is a questionable slight right facial weakness with bilateral lag of the lids. The nasal labial fold is greater on the right. The fundi show patches of exudate with pigmentation. There is some atrophy of the small muscles of the left hand and weakness of the left leg, the heel to shin test being poorly executed.

URINE: Amber; acid; sp. gr. 1025; no sugar nor albumen; few triple phosphate crystals in sediment.

BLOOD: 94% Hgb.; 5,000,000 R.B.C.; 9,800 W.B.C.; N.P.N. 26; B.S. 80; Kahn negative; pressure 124/66.

LUMBAR PUNCTURE: I.P. 90; dynamics normal; 8 cc. removed; F.P. 60; 1 R.B.C.; protein 31 mg/100 cc.; gold sol 0001111100; Wasserman negative.

Encephalography shows no filling of the posterior horn of right ventricle.

A...K...; 4745,027; Male; Age 21; White; Single.

DIAGNOSIS: Epilepsy - hysterical basis; traumatic characteristics.

One and one-half years ago this patient was involved in a serious auto-

mobile accident with injury to his head, and unconsciousness for several hours. Since that time typical epileptic seizures have occurred, preceded by an aura of floating black spots before his eyes and a ringing noise in the right ear. The spots are present most of the time but increase in size just before the onset of a seizure. The attacks occurred a few per day at first and then diminished to one per day for a period of a few weeks, followed by a steady state of occurrence at a rate of one per month. The accompanying unconsciousness may last from a few minutes up to several hours. Frequent mild headaches have been present since the accident.

PHYSICAL EXAMINATION: The patient is well developed and well nourished but has a few small non-tender glands palpable in groins and axillae and a mucopurulent discharge in the pharynx.

NEUROLOGICAL EXAMINATION: There is a questionable slight right facial weakness with bilateral lag of the lids. The nasal labial fold is greater on the right. The fundi show patches of exudate with pigmentation. There is some atrophy of the small muscles of the left hand and weakness of the left leg, the heel to shin test being poorly executed.

URINE: Amber; acid; sp. gr. 1025; no sugar nor albumen; few triple phosphate crystals in sediment.

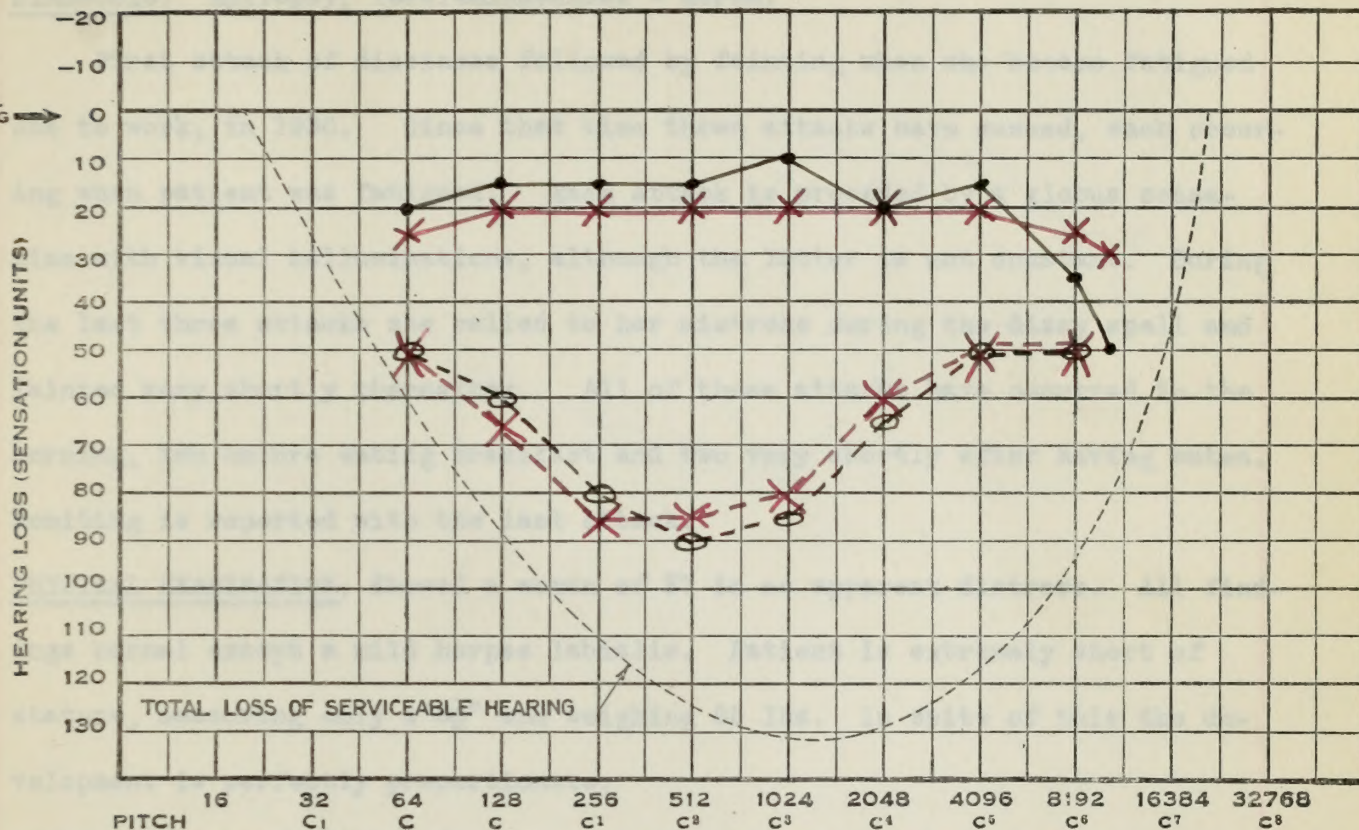
BLOOD: 94% Hgb.; 5,000,000 R.B.C.; 8,800 W.B.C.; 8.0 P.N. 25; R.A. 80; Kahn

negative; pressure 124/88.

LUMBAR PUNCTURE: 1 P. 80; dynamics normal; 8 cc. removed; P.P. 80; I.R.B.C.

protein 31 mg/100 cc.; gold sol 00011100; Wasserman negative.

Encephalography shows no filling of the posterior horn of right ventricle.

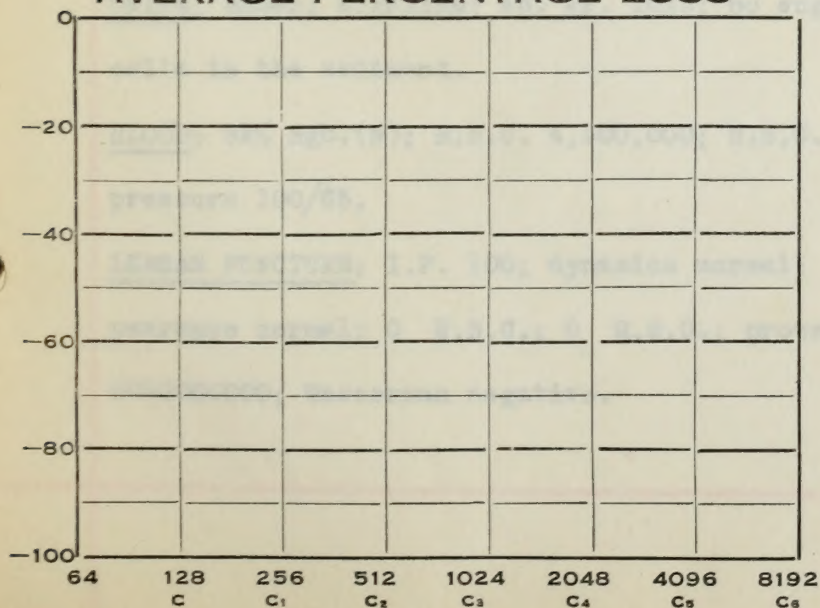
EVANS MEMORIAL**AUDIOGRAM**
 NAME M. B. 739933
 DATE Mar 8 19 34


Percentage Hearing Loss

Right Ear

Left Ear

Weber Left Vertex
= 3 other Points.

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

Right

Left

Rinne AC

BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

EVANS MEMORIAL

AUDIOGRAM

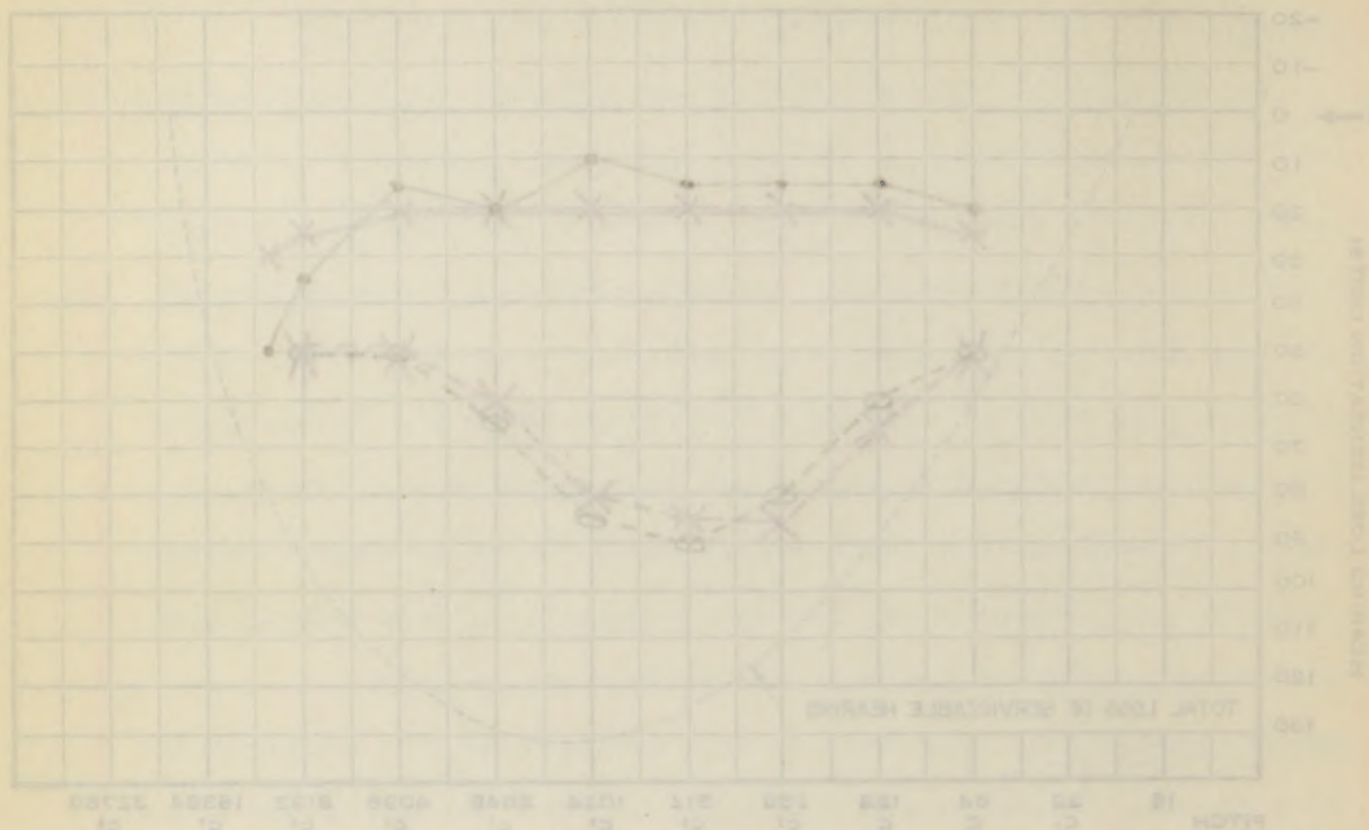
NAME
DATE

M.B.

739933

Mar 8

19 14



M...M...B...; #739,933, Female; Age 27; White; Single.

DIAGNOSIS: Epilepsy; feeble-mindedness - moron.

First attack of dizziness followed by fainting when she became fatigued due to work, in 1930. Since that time three attacks have ensued, each occurring when patient was fatigued. Each attack is preceded by a globus sensation with visual hallucinations, although the latter is not constant. During the last three attacks she called to her mistress during the dizzy spell and fainted very shortly thereafter. All of these attacks have occurred in the morning, two before eating breakfast and two very shortly after having eaten. Vomiting is reported with the last attack.

PHYSICAL EXAMINATION: Showed a woman of 27 in no apparent distress. All findings normal except a mild herpes labialis. Patient is extremely short of stature, measuring only 4'6 $\frac{1}{2}$ " and weighing 85 lbs. In spite of this the development is perfectly proportionate.

NEUROLOGICAL EXAMINATION: Patient is well oriented mentally in all spheres although she appears to have a low I.Q. There is unsustained bilateral nystagmoid jerks and a general deep tendon hyperreflexia and unsustained bilateral patella tendon clonus. Right abdominal reflex greater than left. Encephalogram showed normal filling of ventricles with no atrophy of the brain.

URINE: Amber; alkaline; sp. gr. 1015; no sugar nor albumen; few epithelial cells in the sediment.

BLOOD: 82% Hgb.(S); R.B.C. 4,500,000; W.B.C. 8,000; N.P.N. 30; B.S. 80; pressure 100/65.

LUMBAR PUNCTURE: I.P. 100; dynamics normal; 30 cc. removed; F.P. 0; appearance normal; 0 W.B.C.; 0 R.B.C.; protein 30 mg/100 cc.; gold sol 0000000000; Wasserman negative.

M...W...B...; WBS, 932, Female; Age 27; White; Single.

DIAGNOSIS: Epilepsy; Febrile convulsions - moron.

First attack of dizziness followed by fainting when she became fatigued due to work, in 1930. Since that time three attacks have ensued, each occurring when patient was fatigued. Each attack is preceded by a global sensation with visual hallucinations, although the latter is not constant. During the last three attacks she called to her mother during the dizzy spell and fainted very shortly thereafter. All of these attacks have occurred in the morning, two before eating breakfast and two very shortly after having eaten. Vomiting is reported with the last attack.

PHYSICAL EXAMINATION: Shows a woman of 27 in no apparent distress. All findings normal except a mild herpes labialis. Patient is extremely short of stature, measuring only 4'8 1/2" and weighing 88 lbs. In spite of this the development is perfectly proportionate.

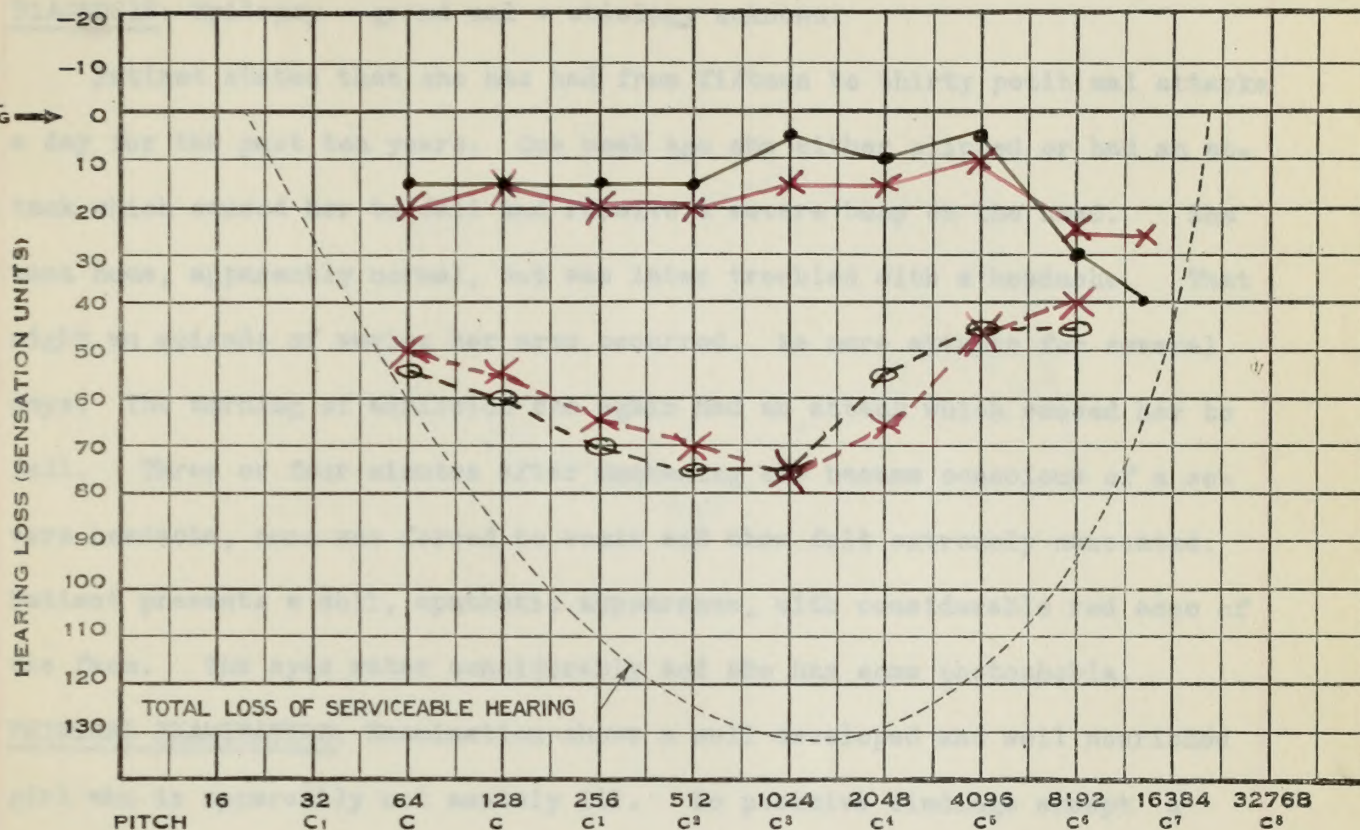
NEUROLOGICAL EXAMINATION: Patient is well oriented mentally in all spheres although she appears to have a low I.Q. There is unexplained bilateral hysteroid jerks and a general deep tendon hyperreflexia and unexplained bilateral patellar tendon clonus. Right abdominal reflex greater than left. Encephalogram showed normal filling of ventricles with no atrophy of the brain.

URINE: Amber; alkaline; sp. gr. 1.015; no sugar nor albumen; few epithelial cells in the sediment.

BLOOD: Hgb. (S); R.B.C. 4,500,000; W.B.C. 8,000; M.P. 30; M.S. 80; pressure 100/85.

LUNAR FUNCTION: I.P. 100; dynamics normal; 30 cc. removed; W.P. 0; sp. pressure normal; 0 W.B.C.; 0 R.B.C.; protein 30 mg/100 cc.; gold col.

000000000; Wasserman negative.

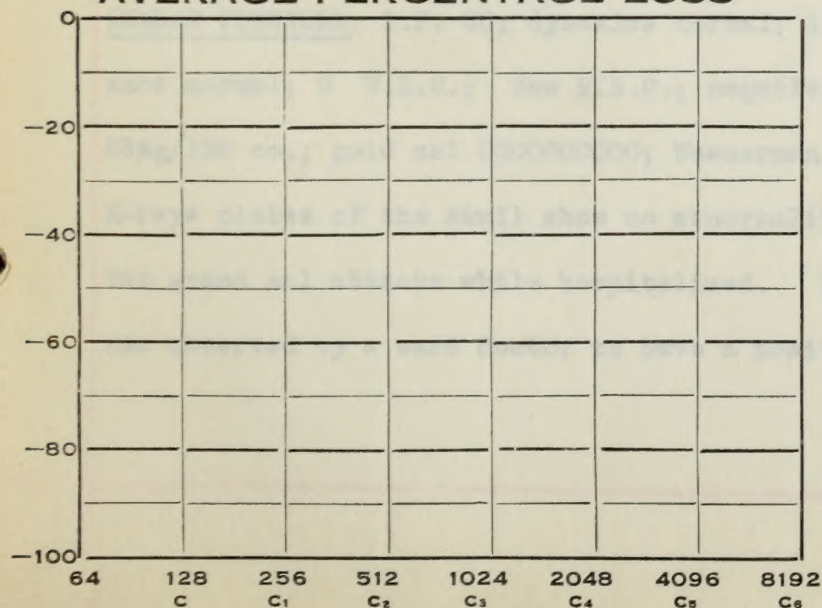
EVANS MEMORIAL**AUDIOGRAM**
 NAME C. G. 739458
 DATE Mar 1 19 34


Percentage Hearing Loss

Right Ear

Left Ear

Weber = 4 points

AVERAGE PERCENTAGE LOSS
 Disease
 Duration
 Chief Symptom.....

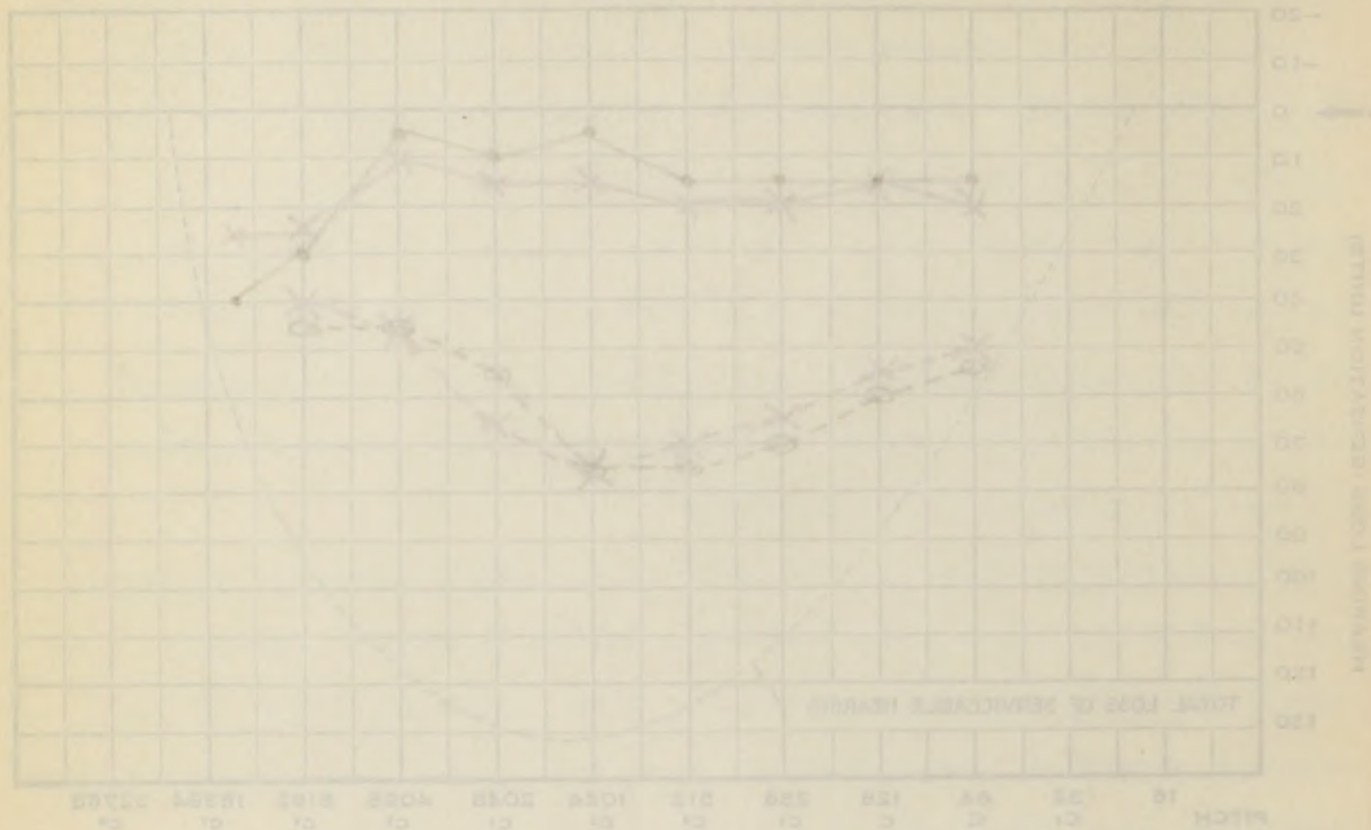
1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

RightLeft
 Rinne AC
 BC
 Weber
 Upper Limit.....
 Lower Limit.....
 Whisper.....
 Voice.....

EYAS MEMORIAL

AUDIOGRAM

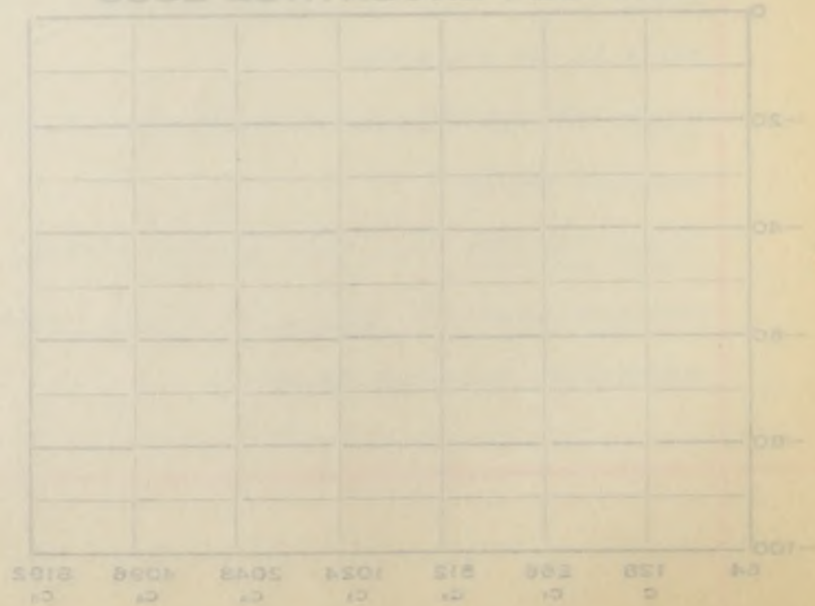
NAME C. G. 739428
DATE Mar 1 1934



Frequency Bands: Low, High, Left Ear, Right Ear

Wcber = 4 points

AVERAGE PERCENTAGE LOSS



C...G... #739,458, Female, Age 19, White, Single.

DIAGNOSIS: Epilepsy - grand mal - etiology unknown.

Patient states that she has had from fifteen to thirty petit mal attacks a day for the past ten years. One week ago she either slipped or had an attack which caused her to fall and receive a severe bump on the head. She went home, apparently normal, but was later troubled with a headache. That night an episode of waving her arms occurred. No more attacks for several days. The morning of admission she again had an attack which caused her to fall. Three or four minutes after awakening she became conscious of a severe headache, soon was forced to vomit and then felt extremely nauseated. Patient presents a dull, apathetic appearance, with considerable red acne of the face. The eyes water considerably and she has some photophobia.

PHYSICAL EXAMINATION: Examination shows a well developed and well nourished girl who is apparently not acutely ill. No positive findings except a slight swelling and tenderness in the right occipital region.

NEUROLOGICAL EXAMINATION: This is entirely negative in all respects.

URINE: Amber; acid; sp. gr. 1015; no albumen or sugar; few epithelial cells in sediment.

BLOOD: 85% Hgb.(S); R.B.C. 4,700,000; W.B.C. 9,200; Pressure 110/76.

LUMBAR PUNCTURE: I.P. 80; dynamics normal; 15 cc. removed; F.P. 40; appearance normal; 0 W.B.C.; few R.B.C.; negative Ross-Jones and Pandy; protein 28mg/100 cc.; gold sol 0000000000; Wasserman negative.

X-rays plates of the skull show no abnormalities.

Two grand mal attacks while hospitalized. Following the first attack she was observed by a ward doctor to have a positive Babinski on the right.

C...S... 4759, 488, Wanda, Age 18, White, Single.

DIAGNOSIS: Epilepsy - Grand mal - etiology unknown.

Patient states that she has had from fifteen to thirty petit mal attacks a day for the past ten years. One week ago she either slipped or had an attack which caused her to fall and receive a severe bump on the head. She went home, apparently normal, but was later troubled with a headache. That night an episode of waving her arms occurred. No more attacks for several days. The morning of admission she again had an attack which caused her to fall. Three or four minutes after awakening she became conscious of a severe headache, soon was forced to vomit and then felt extremely nauseated. Patient presents a dull, apathetic appearance, with considerable redness of the face. The eyes water considerably and she has some photophobia.

PHYSICAL EXAMINATION: Examination shows a well developed and well nourished girl who is apparently not acutely ill. No positive findings except a

slight swelling and tenderness in the right occipital region.

NEUROLOGICAL EXAMINATION: This is entirely negative in all respects.

URINE: Amber; acid; sp. gr. 1.015; no albumen or sugar; few epithelial cells in sediment.

BLOOD: 82% Hgb. (2); R.B.C. 4,700,000; W.B.C. 9,200; Pressure 110/78.

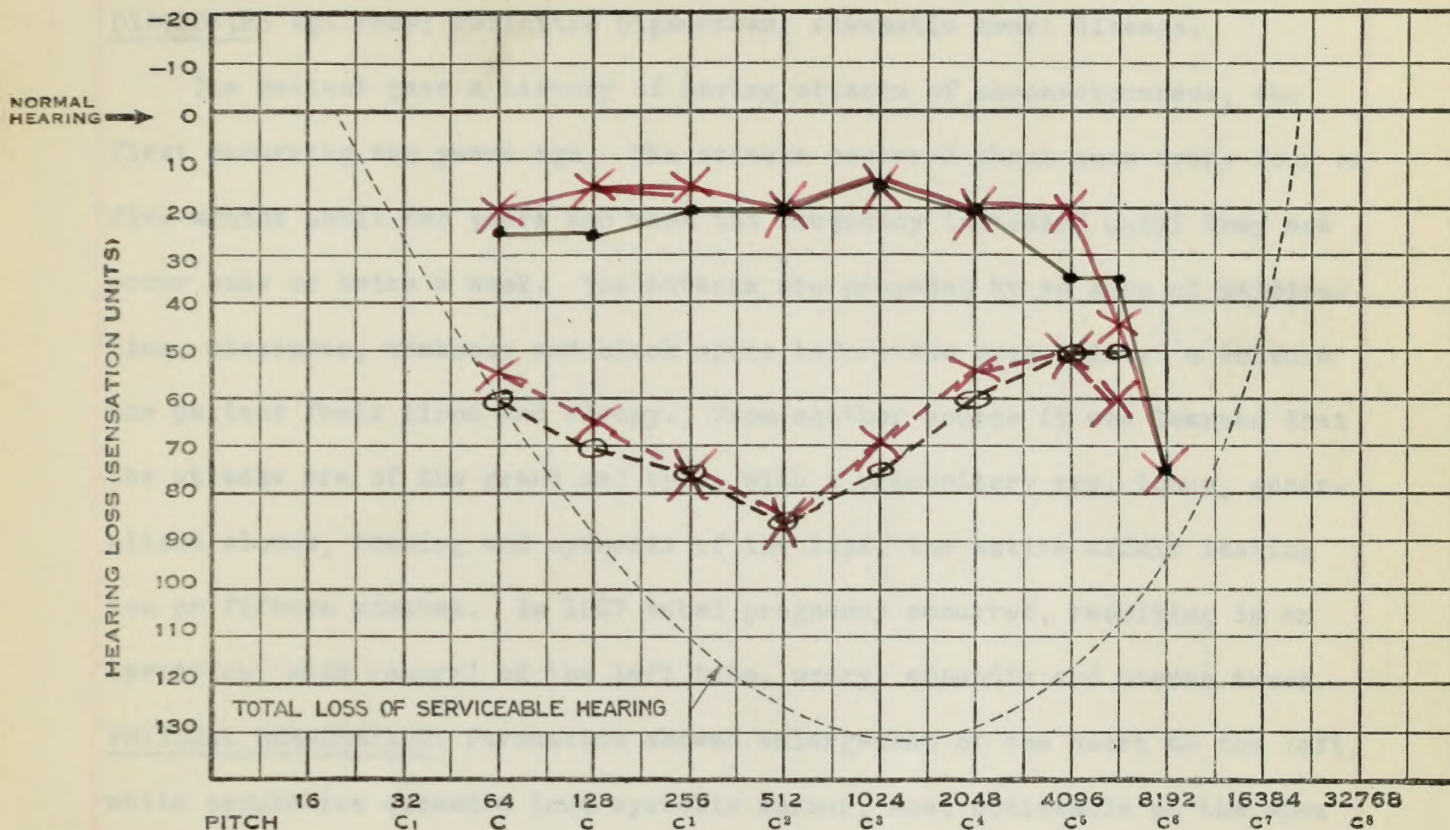
URINARY FUNCTION: I.P. 80; dynamics normal; 15 cc. removed; R.P. 40; appearance normal; 0 W.B.C.; few R.B.C.; negative Rose-Jones and Pandey; protein

284/100 cc.; gold sol 0000000000; Wasserman negative.

X-rays plates of the skull show no abnormalities.

Two grand mal attacks while hospitalized. Following the first attack she

was observed by a ward doctor to have a positive Babinski on the right.

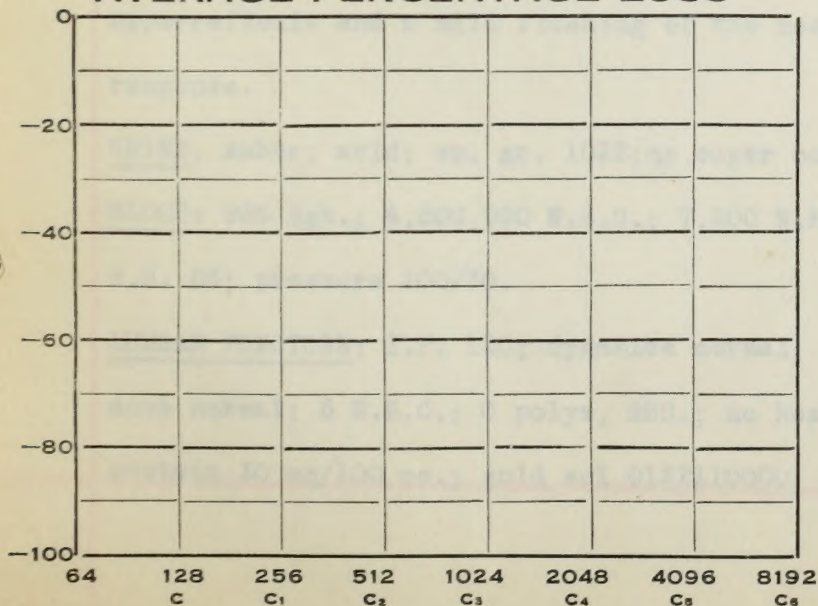
EVANS MEMORIAL**AUDIOGRAM**NAME E. M. 743320
DATE 3-5 19 34

Percentage Hearing Loss

Right Ear

Left Ear

Weber = 4 points.

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain
3. Discharge.....
4. Tinnitus
5. Headache
6. Dizziness.....

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit 8192

Lower Limit.....

Whisper.....

Voice.....

EVANS MEMORIAL

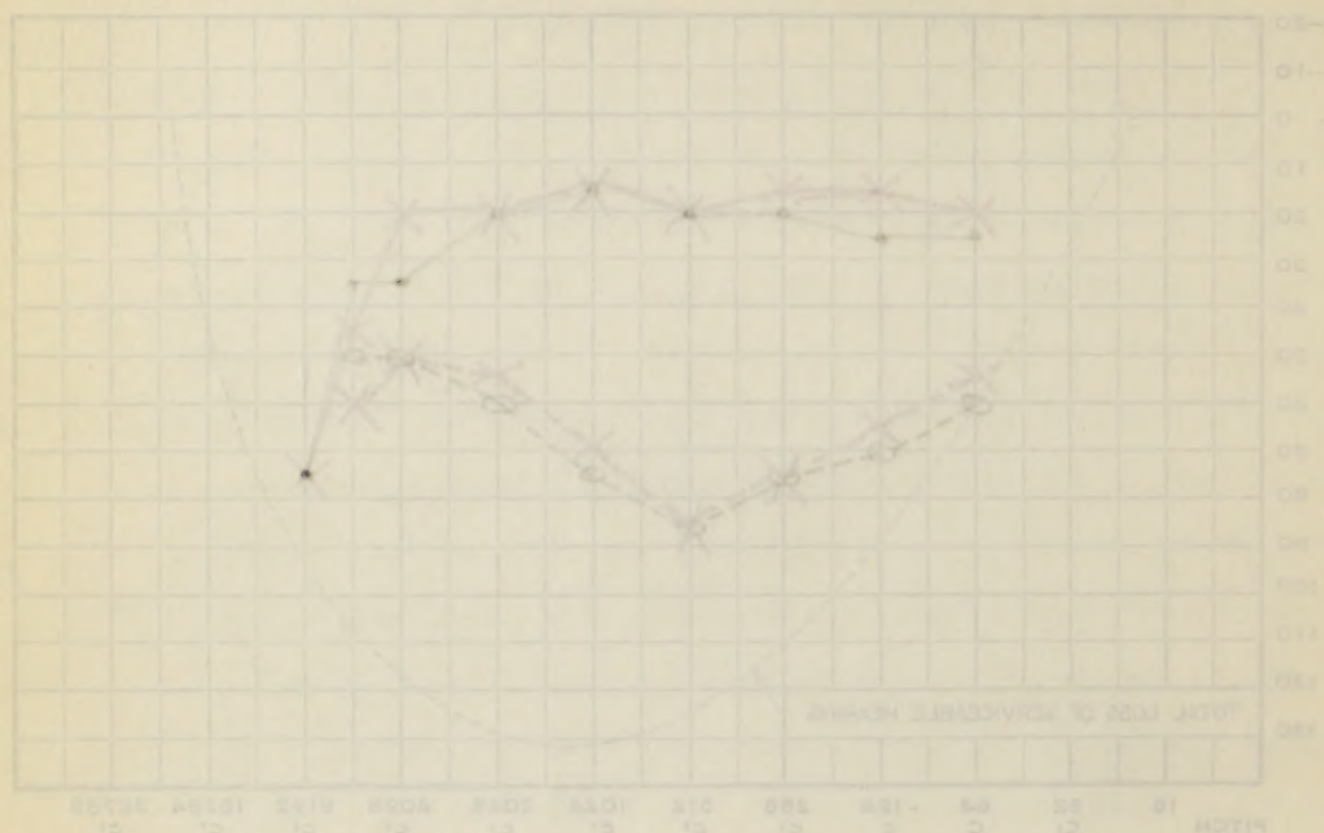
AUDIOGRAM

NAME
DATE

E.M. 743350

3-2

14

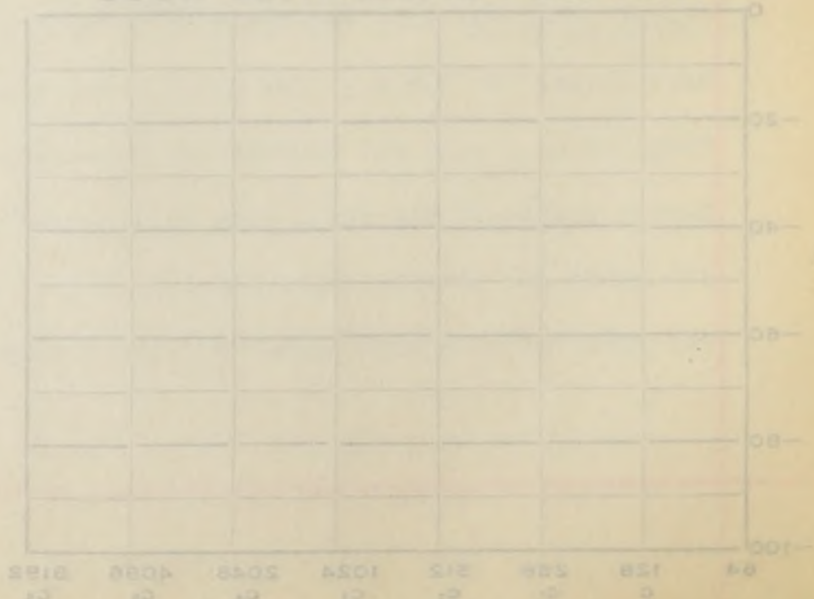


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Diagnosis

Deafness

Other Symptoms

1. Tinnitus

2. Vertigo

3. Headache

4. Dizziness

5. Hearing Loss

6. Deafness

Right

Left

Notes

Upper Limit

Lower Limit

Frequency

Volume

Weber = 4 points

E... M...; #743,320; Female; Age 39; White; Married.

DIAGNOSIS: Epilepsy; retinitis pigmentosa; rheumatic heart disease.

The patient gave a history of having attacks of unconsciousness, the first occurring ten years ago. The attacks occurred about once every four or five months until two years ago when the frequency increased until they now occur once or twice a week. The attacks are preceded by an aura of palpitation, dizziness, weakness and black spots before the eyes. After a seizure the patient feels tired and sleepy. From another source it was learned that the attacks are of the grand mal type, with a premonitory cry, tonus, generalized clonus, foaming and cyanosis of the lips, the entire affair lasting ten or fifteen minutes. In 1927 tubal pregnancy occurred, resulting in an operation, with removal of the left tube, ovary, appendix and uteran tumor.

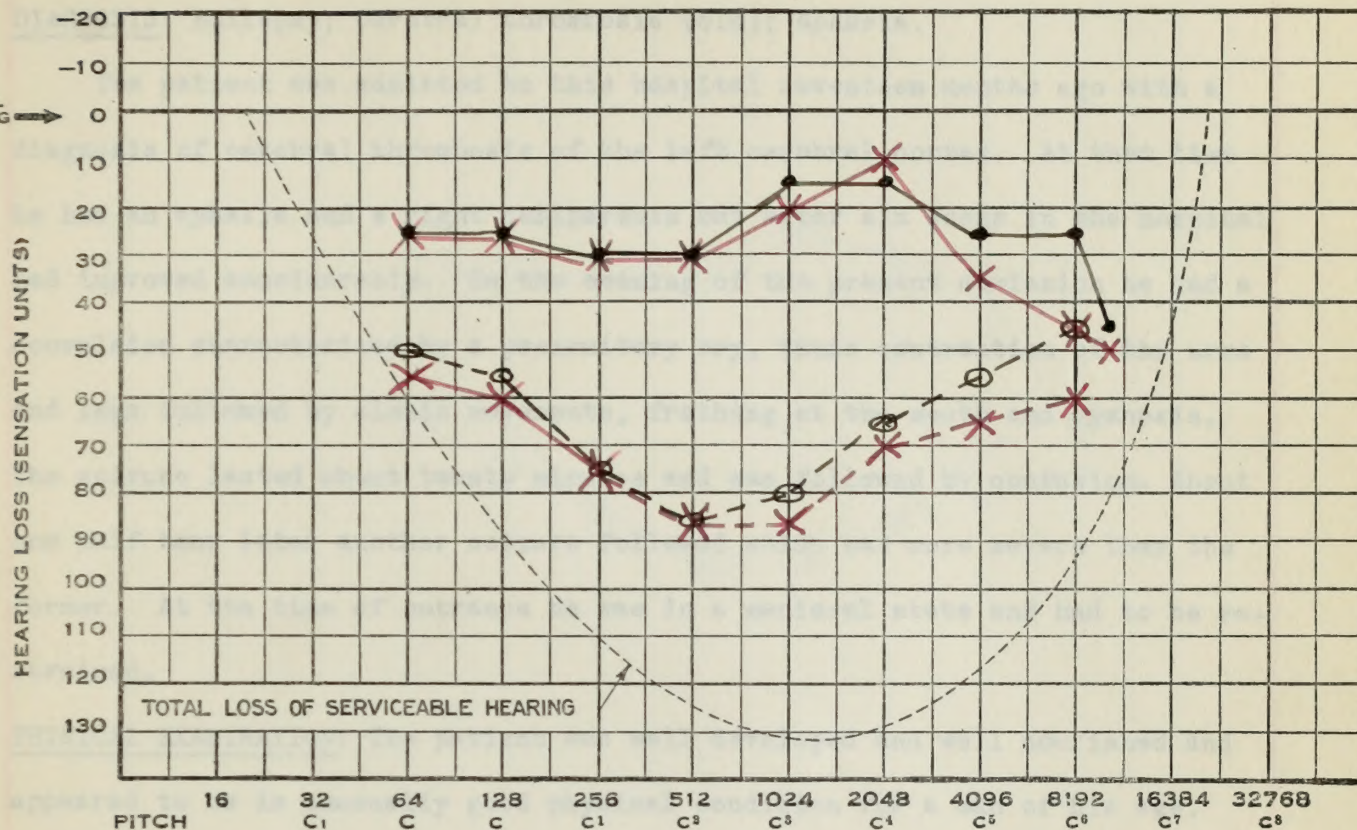
PHYSICAL EXAMINATION: Percussion showed enlargement of the heart to the left, while osculation showed a loud systolic murmur, most noticeable at the apex but transmitted to the base. The second heart sound could be heard only with difficulty because of the loud systolic murmur. All teeth have been removed.

NEUROLOGICAL EXAMINATION: The optic fundi show an absence of cupping, and on both nasal and temporal halves, small, irregular, black pigmented patches. The fields were grossly normal, however. There was a moderate deep tendon hyperreflexia and a mild flushing of the neck with a slight dermographic response.

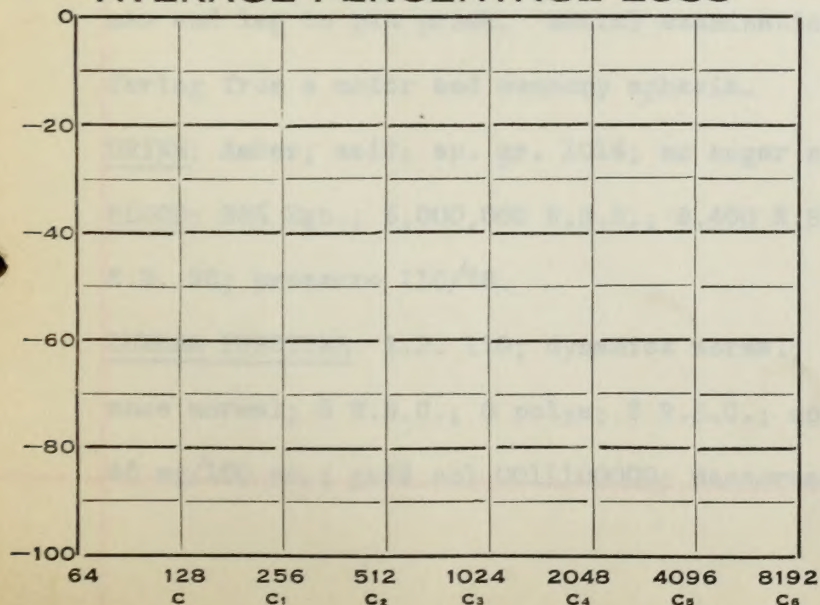
URINE: Amber; acid; sp. gr. 1022; no sugar nor albumen; occasional W.B.C.

BLOOD: 92% Hgb.; 4,800,000 R.B.C.; 7,200 W.B.C.; Kahn negative; N.P.N. 24; B.S. 83; pressure 100/70.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 15 cc. removed; F.P. 60; appearance normal; 3 W.B.C.; 0 polys, RBC.; no Ross-Jones; slightly positive Pandy; protein 30 mg/100 cc.; gold sol 0122110000; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**NAME R. T. Y. 743 157
DATE 19

Weber = 4 Points

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

Right Left

..... Rinne AC

..... BC

..... Weber

..... Upper Limit.....

..... Lower Limit.....

..... Whisper.....

..... Voice.....

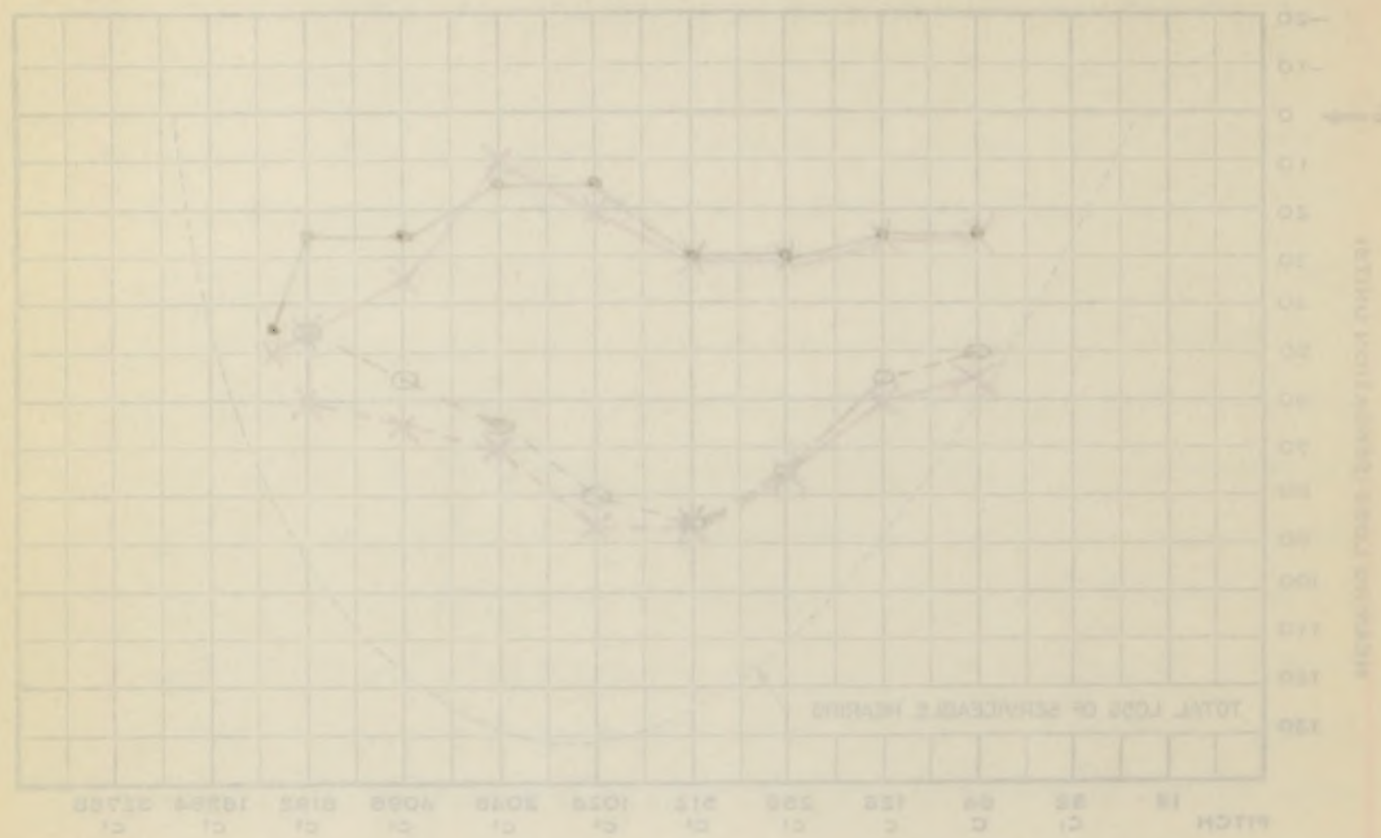
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

R.T.Y.

743127



EVANS MEMORIAL

R... T... Y...; #743,157; Male; Age 53; White; Married.

DIAGNOSIS: Epilepsy; Cerebral thrombosis (old); Aphasia.

The patient was admitted to this hospital seventeen months ago with a diagnosis of cerebral thrombosis of the left cerebral cortex. At that time he had an aphasia and a right hemiparesis but after six weeks in the hospital had improved considerably. On the evening of the present admission he had a convulsion characterized by a premonitory cry, tonic contraction of the arms and legs followed by clonic movements, frothing at the mouth and cyanosis. The seizure lasted about twenty minutes and was followed by confusion. About one half hour later another seizure followed which was more severe than the former. At the time of entrance he was in a maniacal state and had to be restrained.

PHYSICAL EXAMINATION: The patient was well developed and well nourished and appeared to be in unusually good physical condition for a man of his age.

NEUROLOGICAL EXAMINATION: The fundi and pupils were entirely normal, with only a few nystagmoid jerks on fixation to the right and left. There was a tendon hyperreflexia throughout, with a fairly well sustained patellar clonus on the right. There was a positive Babinski and Chaddock on the right and plantar flexion on the left. There was hypaesthesia of the right arm, abdomen and leg to pin prick. Mental examination showed the patient to be suffering from a motor and sensory aphasia.

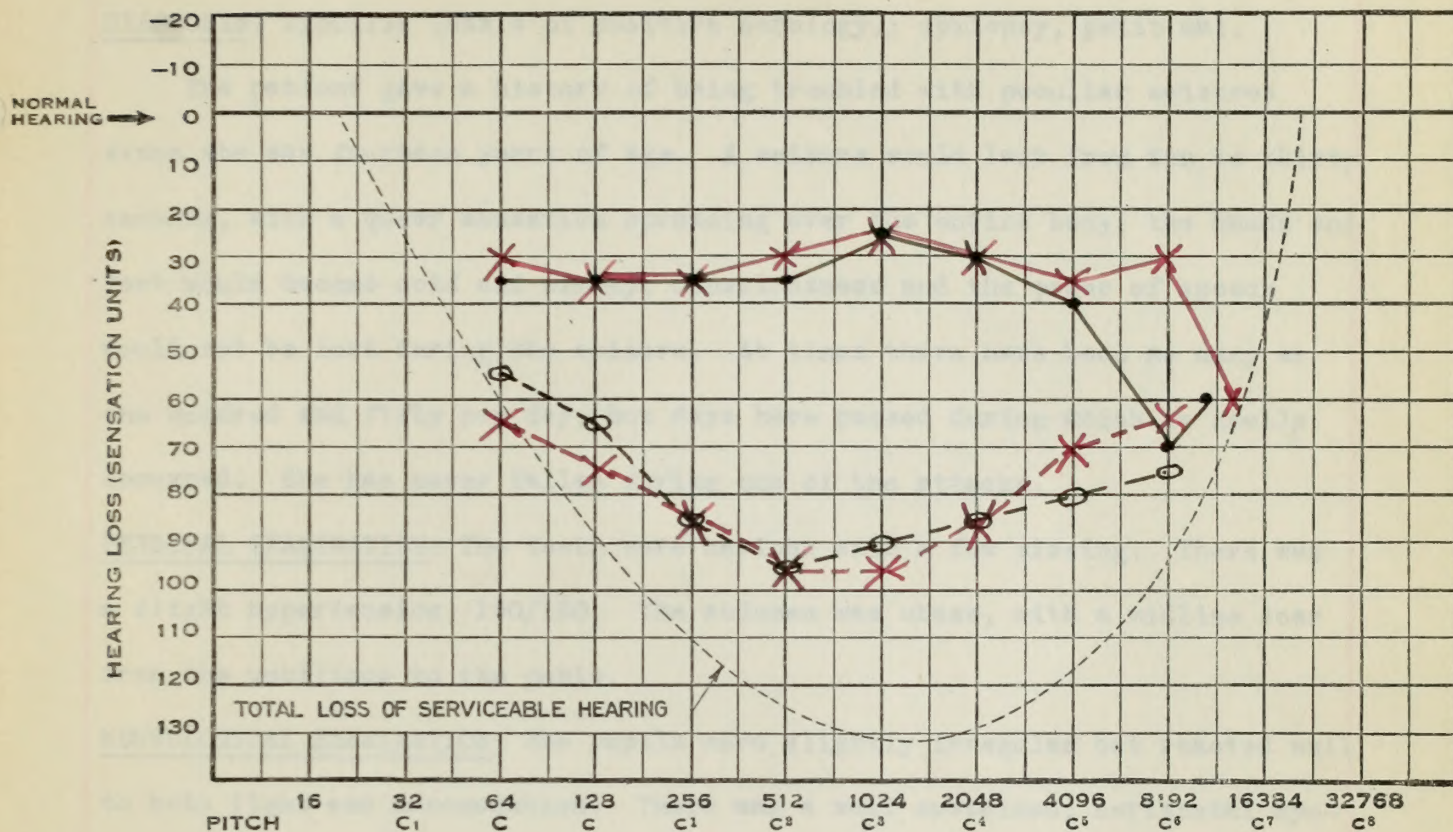
URINE: Amber; acid; sp. gr. 1014; no sugar nor albumen.

BLOOD: 85% Hgb.; 5,000,000 R.B.C.; 8,400 W.B.C.; Kahn negative; N.P.N. 38; B.S. 95; pressure 110/78.

LUMBAR PUNCTURE: I.P. 110; dynamics normal; 15 cc. removed; F.P. 30; appearance normal; 3 W.B.C.; 0 polys; 2 R.B.C.; no Ross-Jones nor Pandy; protein 46 mg/100 cc.; gold sol 0011100000; Wasserman negative.

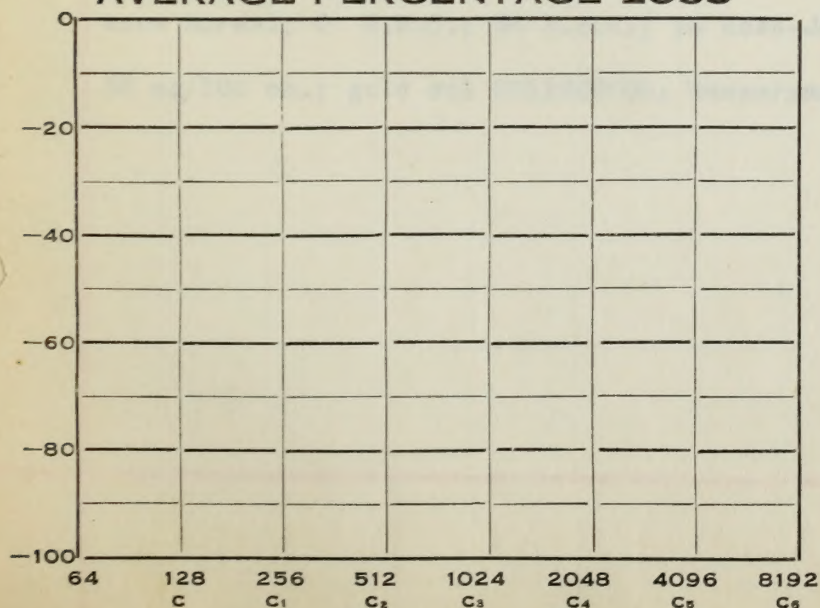
EVANS MEMORIAL

AUDIOGRAM

 NAME A. T. 741179
 DATE 3-15 1934


Weber = 4 points.

AVERAGE PERCENTAGE LOSS



Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right Left

..... Rinne AC

..... BC

..... Weber

..... Upper Limit.....

..... Lower Limit..... 11

..... Whisper.....

..... Voice.....

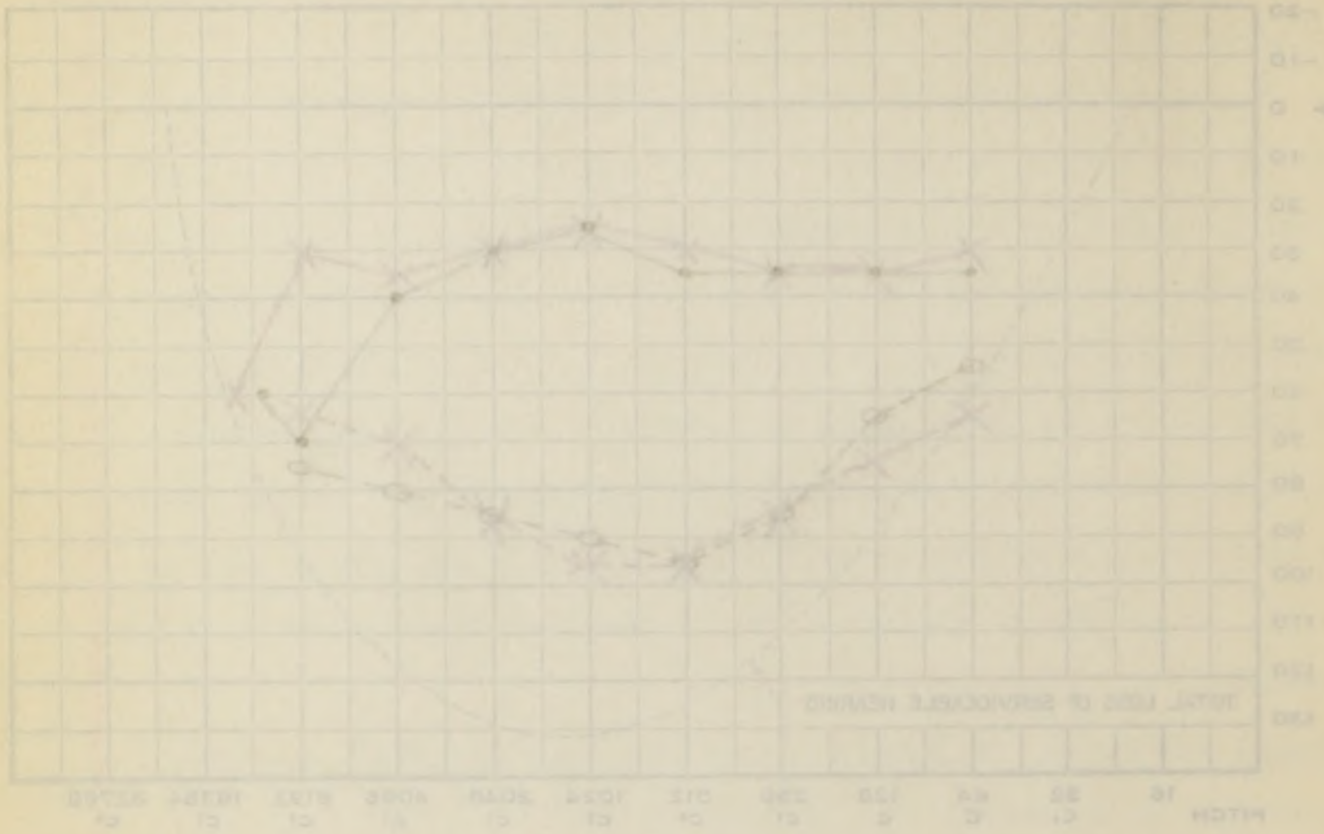
EVAAS MEMORIAL

AUDIOGRAM

NAME
DATE

A.T. 241173

10 24



A.... T....; #741,179; Female; Age 42; White; Married.

DIAGNOSIS: Syphilis (basis of positive serology); epilepsy, petit mal.

The patient gave a history of being troubled with peculiar seizures since she was fourteen years of age. A seizure would last from ten to thirty seconds, with a queer sensation spreading over the entire body; the hands and feet would become cold and clammy; consciousness and the power of speech would not be lost during the seizure. At times there have been as many as one hundred and fifty per day, but days have passed during which no spells occurred. She has never fallen during one of the attacks.

PHYSICAL EXAMINATION: The teeth were carious with a few missing. There was a slight hypertension, 190/120. The abdomen was obese, with a midline scar from the umbilicus to the pubis.

NEUROLOGICAL EXAMINATION: The pupils were slightly irregular but reacted well to both light and accommodation. There was a well sustained, horizontal nystagmus to the right and left. There was a generalized hyperreflexia.

URINE: Amber; cloudy; acid; sp. gr. 1022; no sugar nor albumen; epithelial cells, crystals, and occasional white blood cells in the sediment.

BLOOD: 110% Hgb.; 5,300,000 R.B.C.; 7,200 W.B.C.; Kahn positive, twice.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 15 cc. removed; F.P. 40; appearance normal; 0 W.B.C.; 34 R.B.C.; no Ross-Jones; positive Pandy; protein 33 mg/100 cc.; gold sol 0011000000; Wasserman negative.

A... T...; 44, 175; Female; Age 42; White; Married.

DIAGNOSIS: Syphilis (basis of positive serology); epilepsy, partial.

The patient gave a history of being troubled with partial seizures since she was fourteen years of age. A seizure would last from ten to thirty seconds, with a queer sensation spreading over the entire body; the hands and feet would become cold and clumsy; consciousness and the power of speech would not be lost during the seizure. At times there have been as many as one hundred and fifty per day, but days have passed during which no attacks occurred. She has never fallen during one of the attacks.

PHYSICAL EXAMINATION: The teeth were carious with a few missing. There was a slight hypertension, 100/120. The abdomen was obese, with a slight scar from the umbilicus to the pubis.

NEUROLOGICAL EXAMINATION: The pupils were slightly irritable but reacted well to both light and accommodation. There was a well sustained, horizontal nystagmus to the right and left. There was a generalized hyperreflexia.

URINE: Amber; cloudy; acid; sp. gr. 1022; no sugar nor albumen; epithelial cells, crystals, and occasional white blood cells in the sediment.

BLOOD: 1102 Rbc.; 5,300,000 R.B.C.; 7,200 W.B.C.; Kahn positive, Widal.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 15 cc. removed; 5.5. 40: protein

none normal; 0 W.B.C.; 34 R.B.C.; no Rose-Jones; positive Widal; protein

35 mg/100 cc.; gold and gelatin negative.

EVANS MEMORIAL

AUDIOGRAM

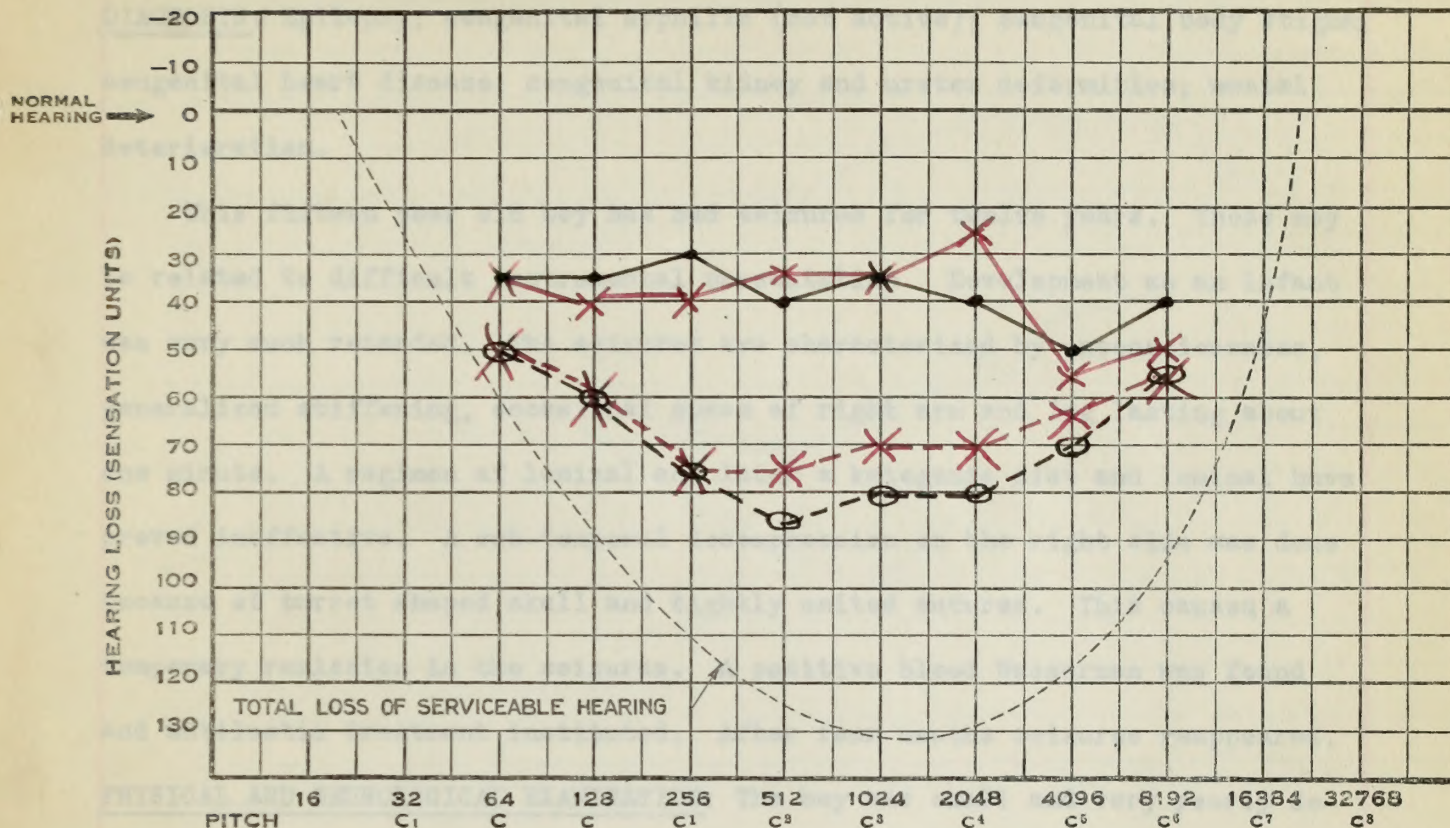
NAME

L. O. 711409

DATE

Jun 28

19 33



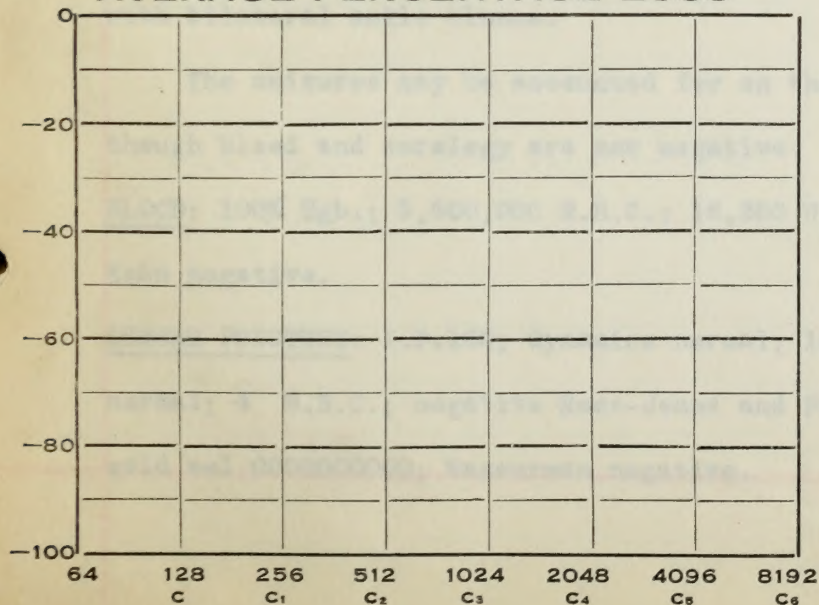
Percentage Hearing Loss

Right Ear

Left Ear

Weber: right at vertex
 left at { forehead
 nose bridge
 chin.

AVERAGE PERCENTAGE LOSS



Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeftRinne $\frac{AC}{BC}$

Weber

8192

Upper Limit. 8192

Lower Limit

Whisper

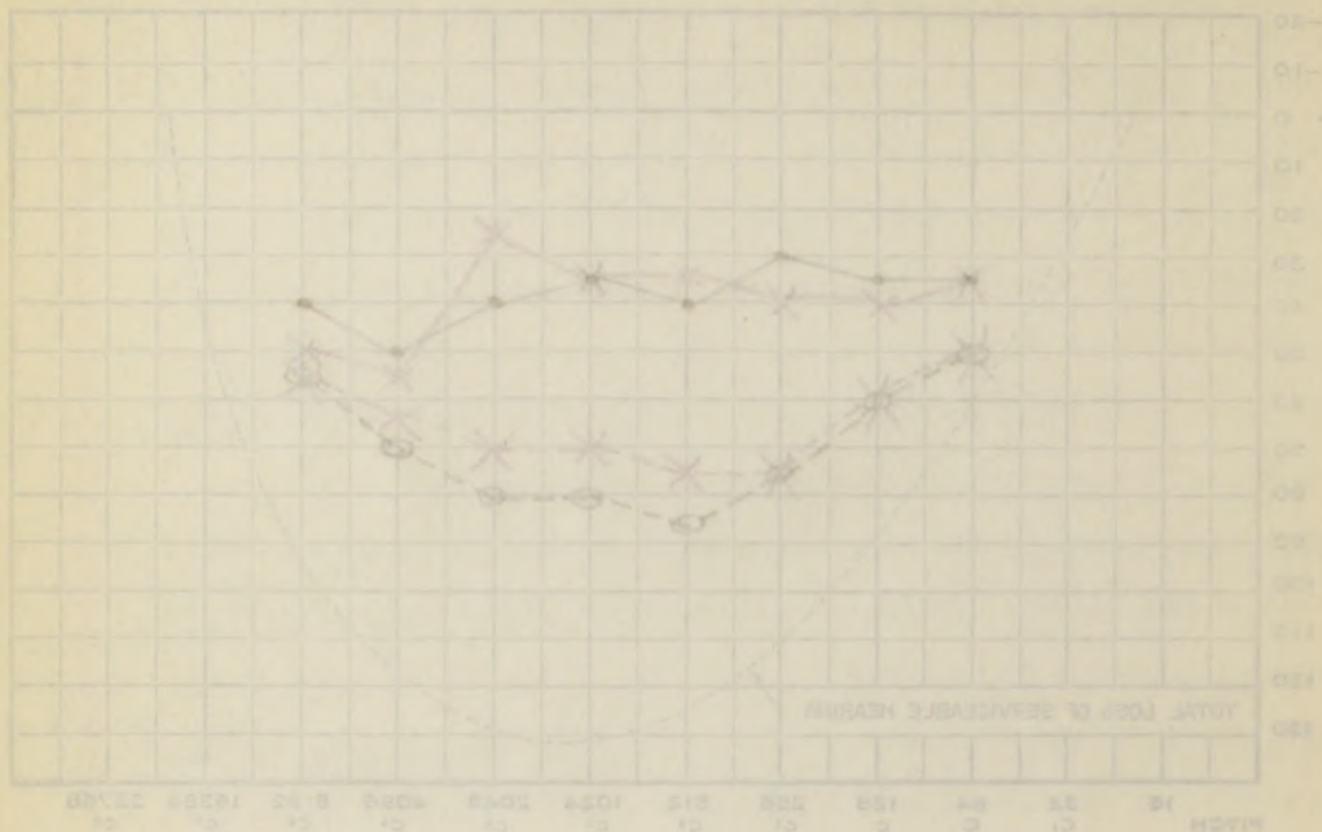
Voice

EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

L.O. 711409
Jun 28 1933



L...O...; #711,409; Male; Age 15; White; Single.

DIAGNOSIS: Epilepsy; congenital syphilis (not active); congenital body stigma; congenital heart disease; congenital kidney and ureter deformities; mental deterioration.

This fifteen year old boy has had seizures for twelve years. These may be related to difficult instrumental presentation. Development as an infant was very much retarded. The seizures are characterized by unconsciousness, generalized stiffening, occasional spasm of right arm and leg lasting about one minute. A regimen of luminal and later a ketogenic diet and luminal have proved ineffective. A sub-temporal decompression on the right side was done because of turret shaped skull and tightly united sutures. This caused a temporary remission in the seizures. A positive blood Wasserman was found and antiluetic treatment instituted. After four months seizures reappeared.

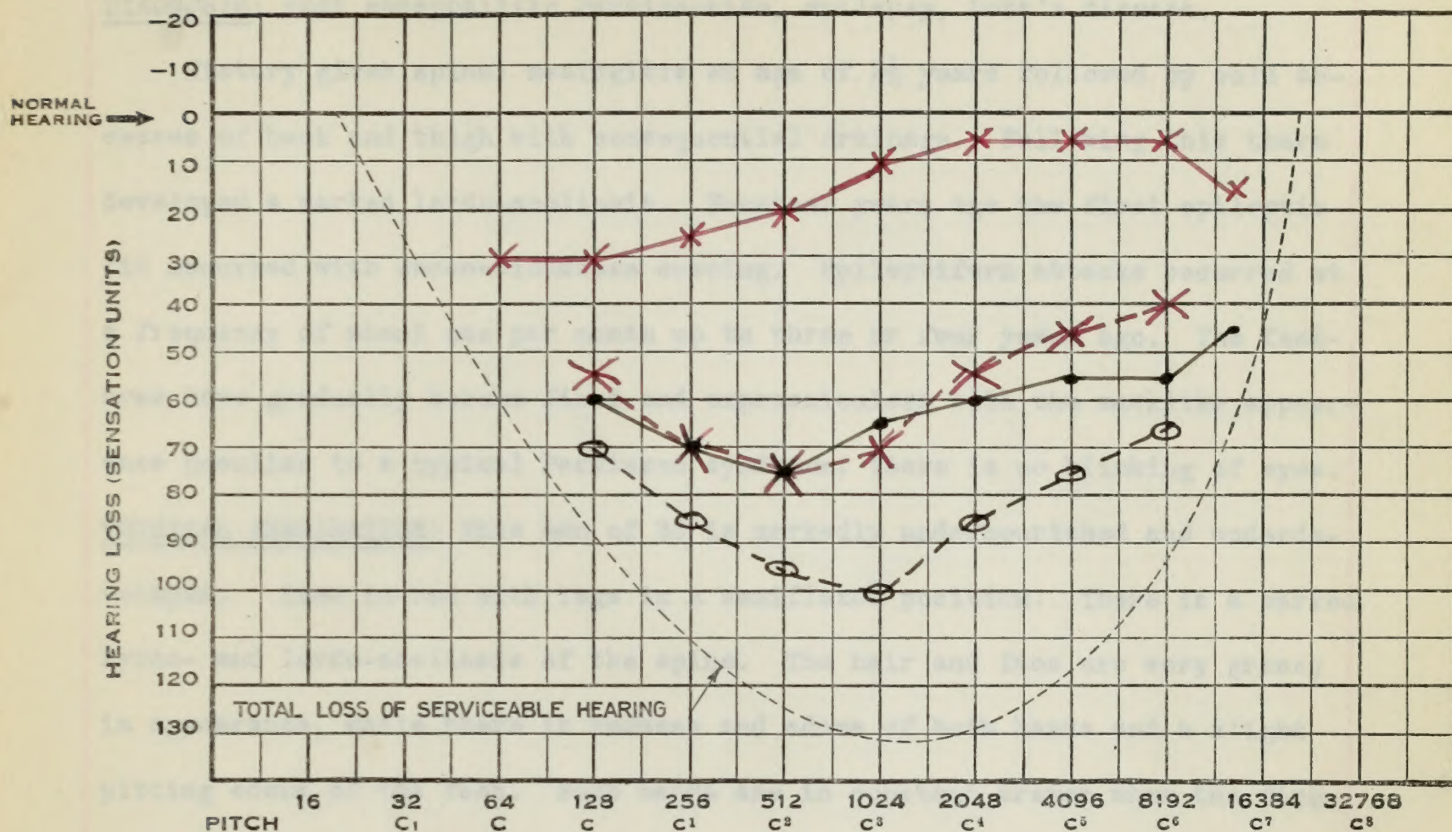
PHYSICAL AND NEUROLOGICAL EXAMINATION: The boy was small and very poorly developed with behavior definitely below par for his age. The speech had the quality heard with cleft palate. The head was poorly formed. The teeth were peculiar to congenital syphilitics. The heart showed enlargement on the left with a loud systolic murmur. All long bones were shortened. There was marked optic atrophy and vision of 20/200 in both eyes. All reflexes exaggerated, with bilateral ankle clonus.

The seizures may be accounted for on the basis of luetic meningitis even though blood and serology are now negative.

BLOOD: 100% Hgb.; 5,500,000 R.B.C.; 16,350 W.B.C.; next day 8,500 W.B.C.; Kahn negative.

LUMBAR PUNCTURE: I.P.160; dynamics normal; 15 cc. removed; F.P. 0; appearance normal; 4 W.B.C.; negative Ross-Jones and Pandy; protein 41 mg/100 cc.; gold sol 0000000000; Wasserman negative.

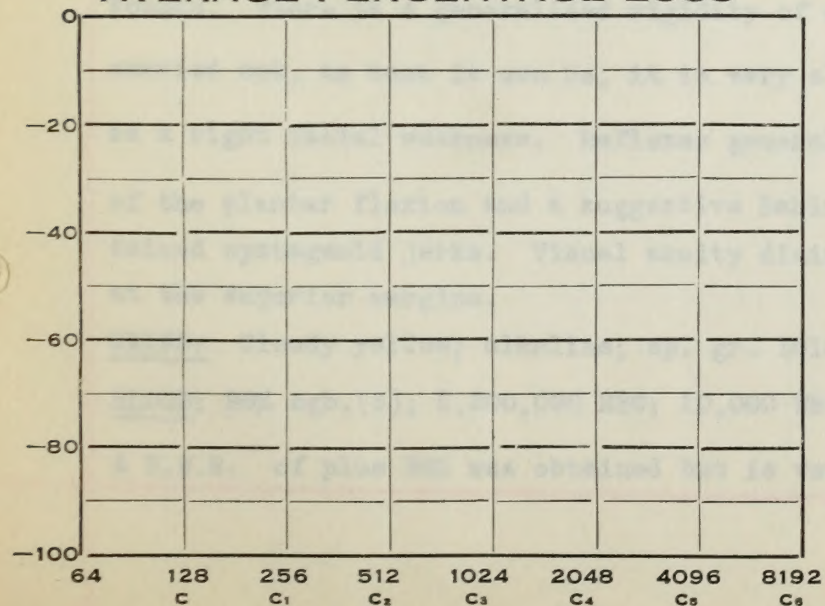
[illegible]

EVANS MEMORIAL**AUDIOGRAM**
 NAME W.B. 740384
 DATE Mar 6 19 34


Percentage Hearing Loss

Right Ear

Left Ear

*Weber not tested.***AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

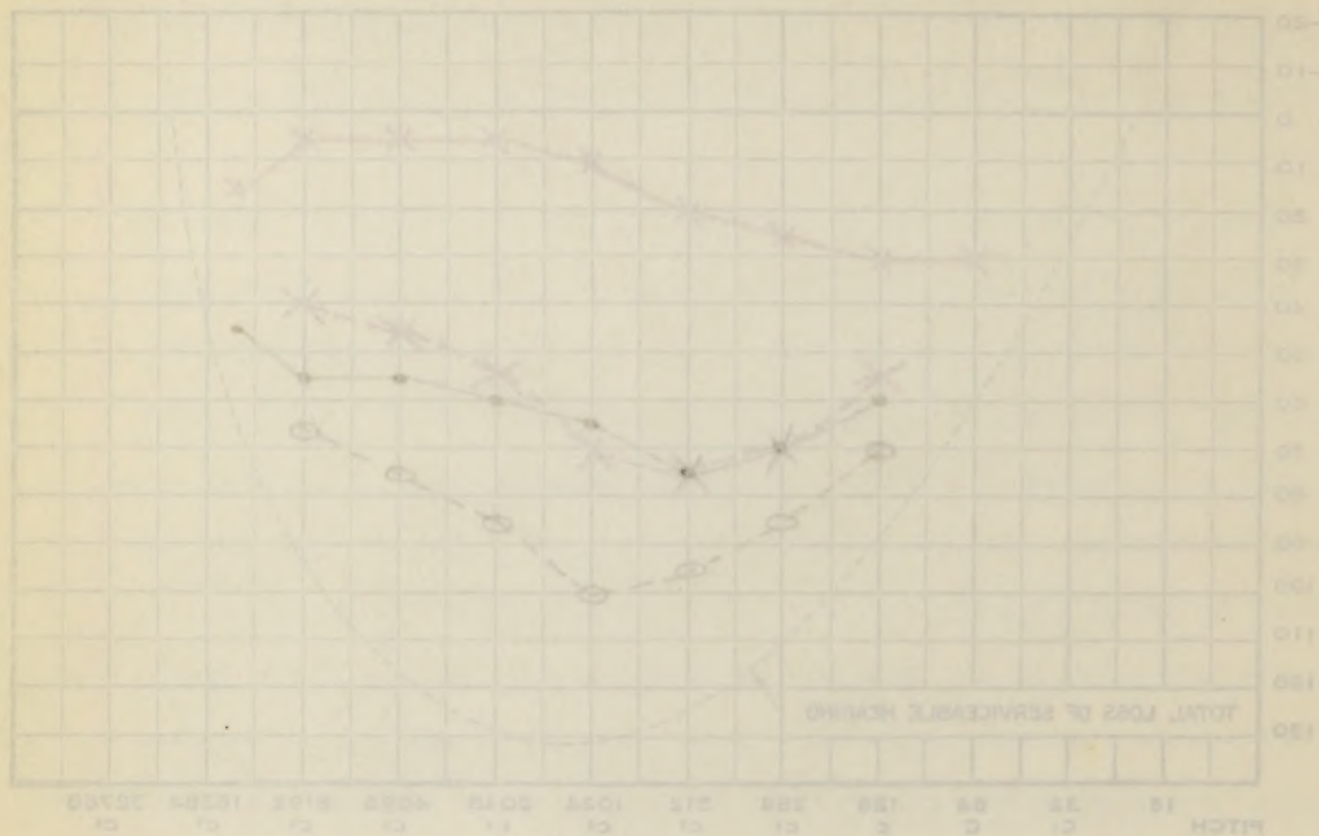
AUDIOGRAM

NAME W.B.

740384

DATE

Mar 10 1934



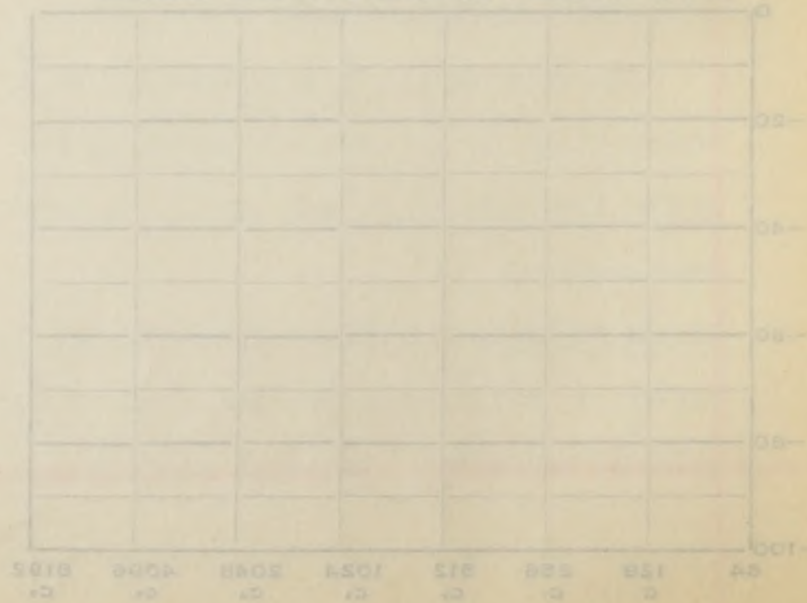
Percentage Hearing Loss

Right Ear

Left Ear

Weber not tested.

AVERAGE PERCENTAGE LOSS



Right

Left

1. Right

2. Left

3. Right

4. Left

5. Right

6. Left

Right

Left

Upper Limb

Lower Limb

Upper Limb

Lower Limb

W...D...B...; #740,384; Male; Age 33; White; Single.

DIAGNOSIS: Post encephalitic Parkinsonism, epilepsy, Pott's disease.

History gives spinal meningitis at age of $2\frac{1}{2}$ years followed by cold abscesses of back and thigh with consequential drainage. Following this there developed a marked lordo-scoliosis. Fourteen years ago the first epileptic fit occurred with unconsciousness ensuing. Epileptiform attacks occurred at a frequency of about one per month up to three or four years ago. The features have gradually become fixed and expressionless with the masklike appearance peculiar to a typical Parkinson syndrome. There is no blinking of eyes.

PHYSICAL EXAMINATION: This man of 33 is markedly undernourished and underdeveloped. Lies in bed with legs in a semiflexed position. There is a marked kypho- and lordo-scoliosis of the spine. The hair and face are very greasy in appearance, while there is redness and edema of both hands and a slight pitting edema of the feet. Both hands are in constant tremor when the fingers are extended, but tremor disappears when the fingers and wrist are markedly flexed. All the extremities are rigid. Heart shows a slight enlargement to left with apical systolic murmur. Chest very deformed due to Pott's disease.

NEUROLOGICAL EXAMINATION: Speech is a monotonous, unintelligible jumble of sounds. There is a generalized rigidity of all muscles. When a movement is carried out, as best it can be, it is very slow and labored. There seems to be a right facial weakness. Reflexes generally hyperactive with exception of the plantar flexion and a suggestive Babinski on left. There are unsustained nystagmoid jerks. Visual acuity diminished; fundi show some blurring at the superior margins.

URINE: Cloudy yellow; alkaline; sp. gr. 1016; no sugar nor albumen.

BLOOD: 96% hgb.(S); 5,200,000 RBC; 10,000 WBC; Kahn negative; N.P.N. 29.

A B.M.R. of plus 34% was obtained but is very questionable.

W...D...B...; 4440, 384; Male; Age 33; White; Single.

DIAGNOSIS: Post encephalitic Parkinsonism, epilepsy, Pott's disease.

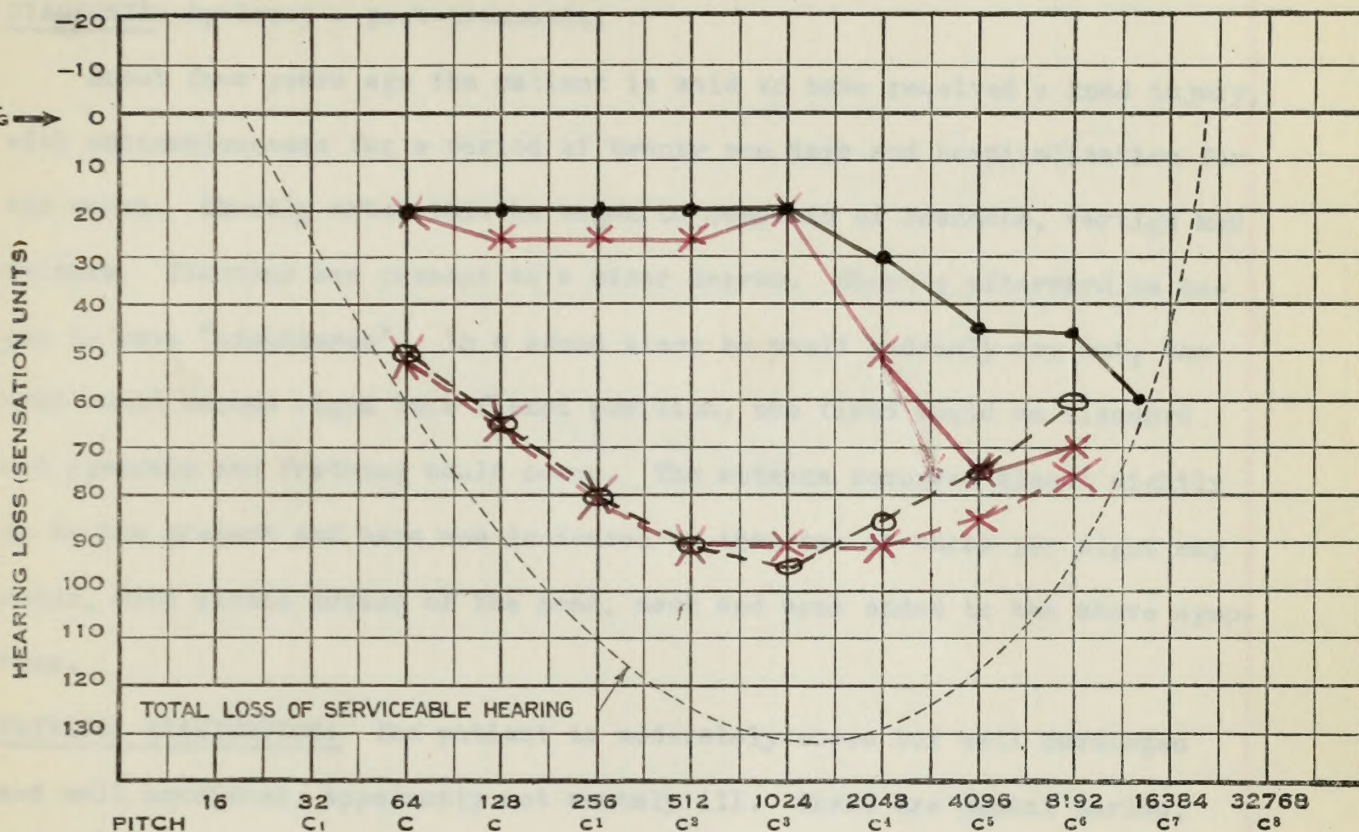
History gives spinal meningitis at age of 2½ years followed by cold abscesses of back and thigh with consequential drainage. Following this there developed a marked lordo-scoliosis. Fourteen years ago the first epileptic fit occurred with unconsciousness ensuing. Epileptic attacks occurred at a frequency of about one per month up to three or four years ago. The feet have gradually become fixed and expressions with the masklike appearance peculiar to a typical Parkinson syndrome. There is no blinking of eyes. PHYSICAL EXAMINATION: This man of 33 is markedly undernourished and underdeveloped. Lies in bed with legs in a semiflexed position. There is a marked kypho- and lordo-scoliosis of the spine. The hair and face are very greasy in appearance, while there is redness and edema of both hands and a slight pitting edema of the feet. Both hands are in constant tremor when the fingers are extended, but tremor disappears when the fingers and wrist are markedly flexed. All the extremities are rigid. Heart shows a slight enlargement to left with apical systolic murmur. Chest very deformed due to Pott's disease.

NEUROLOGICAL EXAMINATION: Speech is a monotonous, unintelligible jumble of sounds. There is a generalized rigidity of all muscles. When a movement is carried out, as best it can be, it is very slow and labored. There seems to be a right facial weakness. Reflexes generally hyperactive with exception of the plantar flexion and a suggestive Babinski on left. There are untained myoclonic jerks. Visual acuity diminished; hands show some blurring at the superior margins.

URINE: Cloudy yellow; alkaline; sp. gr. 1.016; no sugar nor albumen.

BLOOD: 98% hgb.(s); 5,200,000 RBC; 10,000 WBC; Kahn negative; W.P.W. 32.

A B.M.R. of plus 344 was obtained but is very questionable.

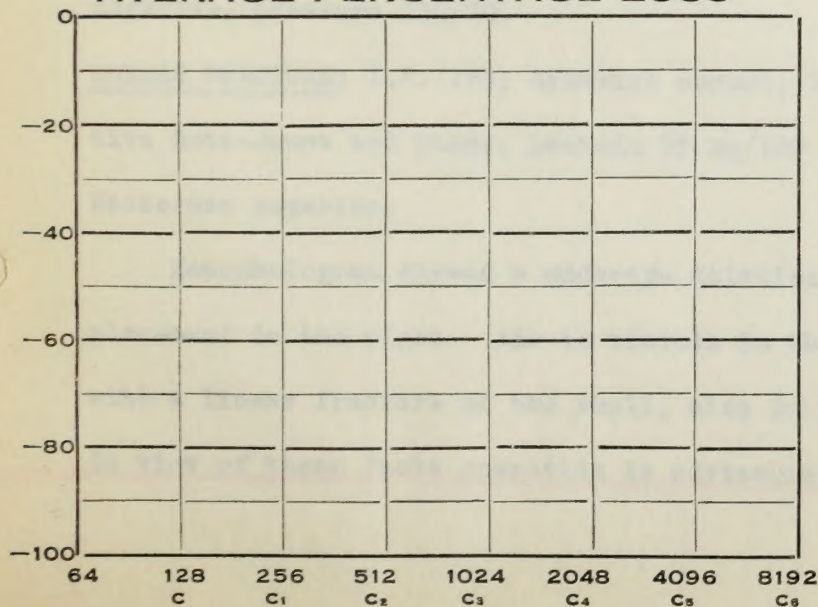
EVANS MEMORIAL**AUDIOGRAM**NAME C. R. 740503
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

Weber = 4 Points

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness.....

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeft

Rinne AC

BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

EVANS MEMORIAL

C...R....: #740,503; Male; Age 35; White; Married.

DIAGNOSIS: Epilepsy - post-traumatic.

About four years ago the patient is said to have received a head injury, with unconsciousness for a period of twenty one days and hospitalization for six weeks. Shortly after this he began to complain of headache, vertigo and malaise. Tinnitus was present to a minor degree. Shortly afterward he began to have "nightmares". In a sound sleep he would suddenly cry out, the arms would become rigid in a flexed position, the fists would be clenched and cyanosis and frothing would occur. The attacks occurred almost nightly up to the present and have now increased so that two or three per night may occur, with clonic motion of the head, neck and arms added to the above symptoms.

PHYSICAL EXAMINATION: The patient is moderately obese but well developed and well nourished, apparently not acutely ill. There are dental caries, acne rosacea, and moderate pulmonary emphysema.

NEUROLOGICAL EXAMINATION: Patient is rational and well oriented. Normal findings.

URINE: Amber; acid; sp. gr. 1025; no sugar nor albumen.

BLOOD: 89% Hgb.; 4,810,000 R.B.C.; 21,400 W.B.C.; N.P.N. 58; B.S. 83; Kahn negative; pressure 110/70.

LUMBAR PUNCTURE: I.P. 170; dynamics normal; 15 cc. removed; F.P. 50; positive Ross-Jones and Pandy; protein 56 mg/100 cc.; gold sol 0011110000; Wasserman negative.

Encephalogram showed a moderate dilation of all the ventricles with displacement to the right. Air is visible in the left fronto-parietal region, with a linear fracture of the skull, also in the left fronto-parietal region. In view of these facts operation is advisable.

C...E...: 5740, 503; Male; Age 35; White; Married.

DIAGNOSIS: Epilepsy - post-traumatic.

About four years ago the patient is said to have received a head injury with unconsciousness for a period of twenty one days and hospitalization for six weeks. Shortly after this he began to complain of headache, vertigo and malaise. Tremor was present to a minor degree. Shortly afterward he began to have "nightmares". In a sound sleep he would suddenly cry out, the arms would become rigid in a flexed position, the fists would be clenched and cyanosis and frothing would occur. The attacks occurred almost nightly up to the present and have now increased so that two or three per night may occur, with clonic motion of the head, neck and arms added to the above symptoms.

PHYSICAL EXAMINATION: The patient is moderately obese but well developed and well nourished, apparently not acutely ill. There are dental caries, some rosacea, and moderate pulmonary emphysema.

NEUROLOGICAL EXAMINATION: Patient is rational and well oriented. Normal

findings.

URINE: Amber; acid; sp. gr. 1025; no sugar nor albumen.

BLOOD: 83% Hgb.; 4,810,000 R.B.C.; 21,400 W.B.C.; W.P.R. 58; H.S. 83; Kahn

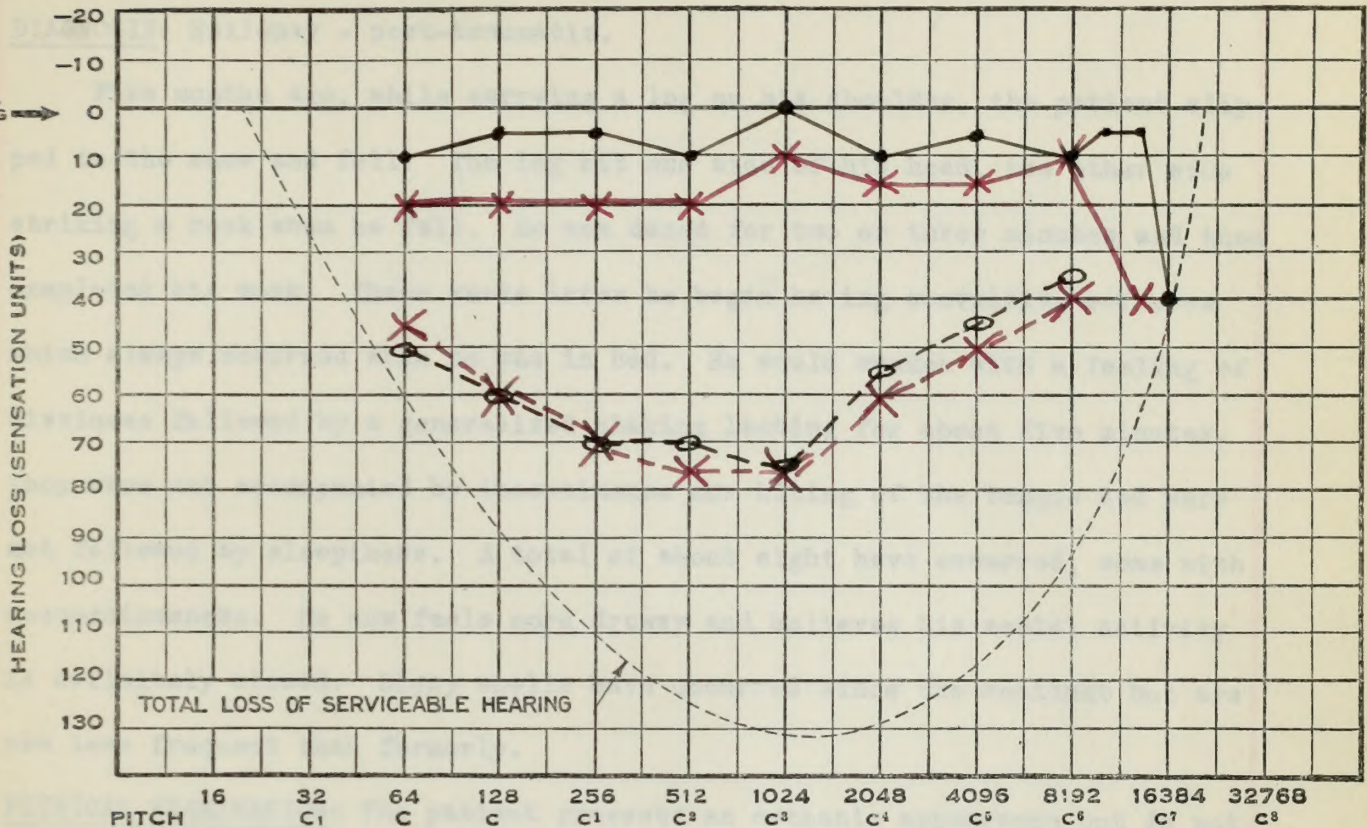
negative; pressure 110/70.

LUMBAR PUNCTURE: I.P. 170; dynamics normal; 15 cc. removed; F.P. 50; post-

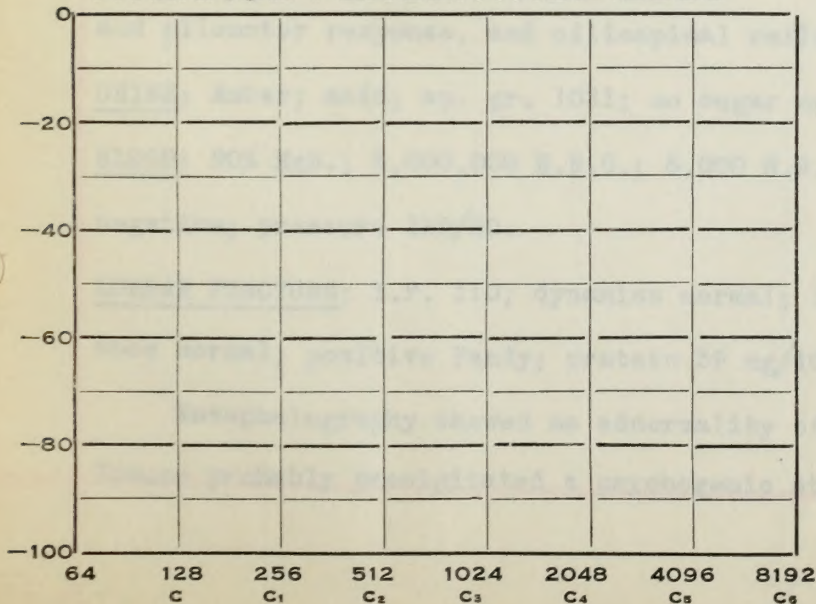
itive Rosen-Jones and Pandey; protein 58 mg/100 cc.; Gold sol 0011/10000;

Wasserman negative.

Encephalogram showed a moderate dilation of all the ventricles with displacement to the right. Air is visible in the left fronto-parietal region, with a linear fracture of the skull, also in the left fronto-parietal region. In view of these facts operation is advisable.

EVANS MEMORIAL**AUDIOGRAM**NAME H. D. 745212
DATE..... 19.....

Weber Left 4 Points.

AVERAGE PERCENTAGE LOSSDisease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right

Left

Rinne ^{AC}/_{BC}

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

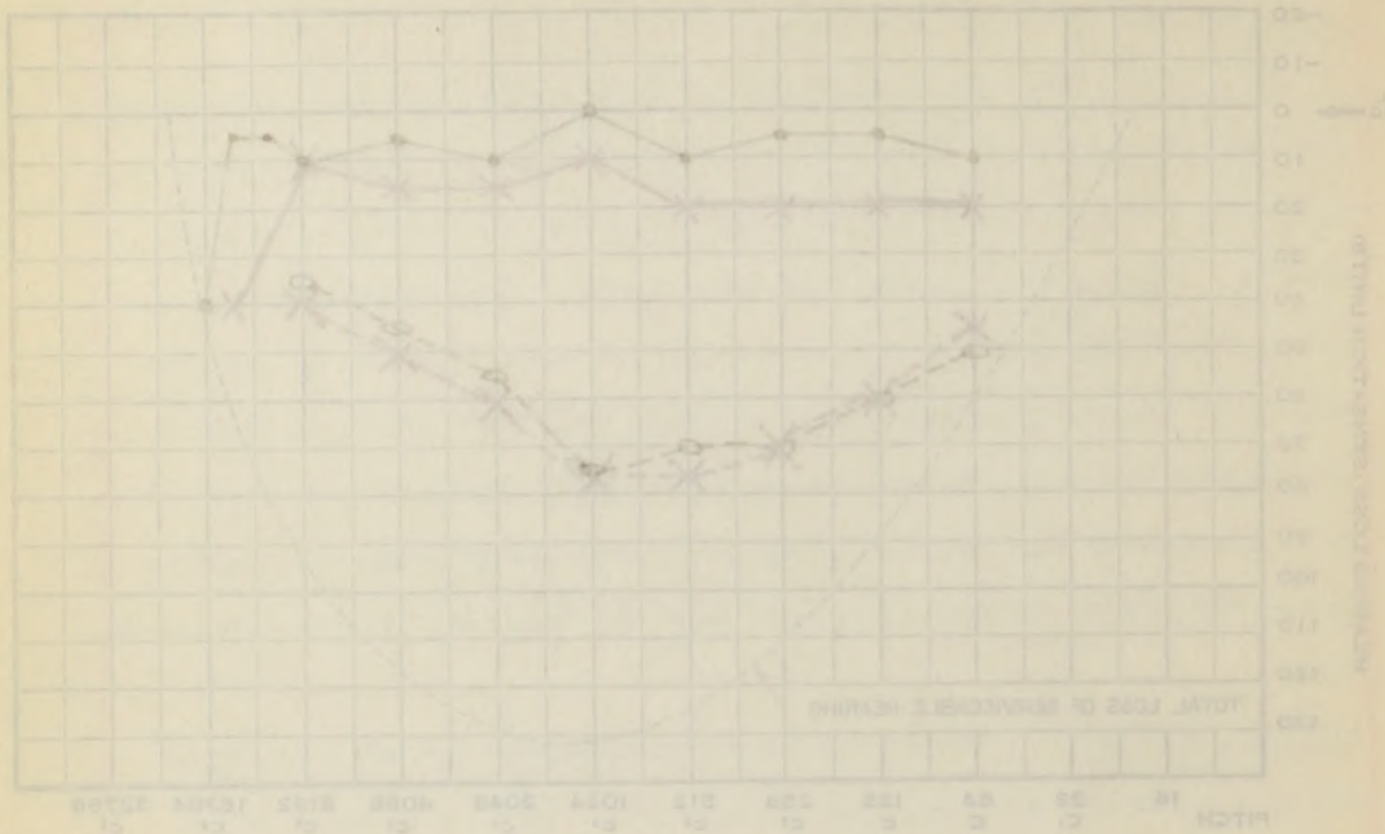
EVANS MEMORIAL

AUDIOGRAM

NAME H. D.

DATE 7/12/21

19



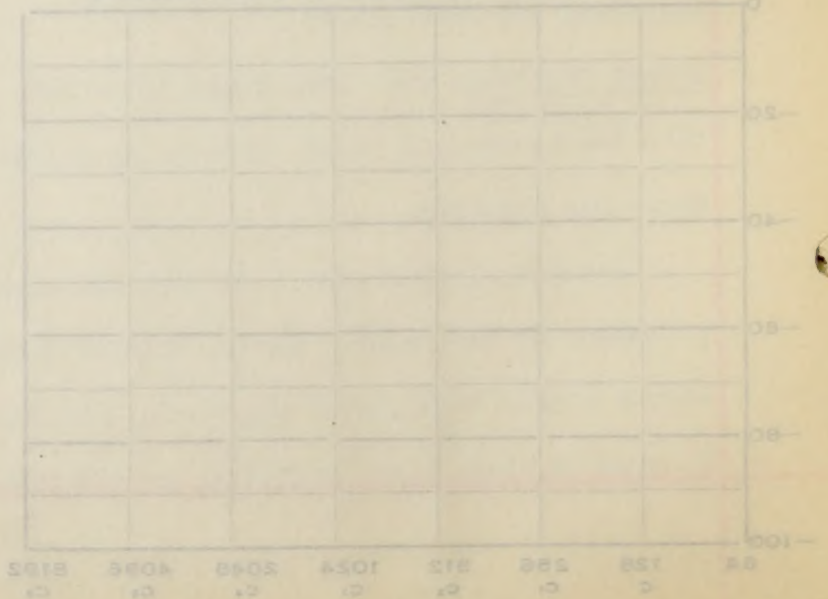
Frequency Hearing Loss

Right Ear

Left Ear

Weber Left 4 Points

AVERAGE PERCENTAGE LOSS



Diagnosis

Duration

Chief Complaint

1. Deafness

2. Tinnitus

3. Dizziness

4. Headache

5. Nervousness

Notes

Speech

Writing

Upper Limit

Lower Limit

Whisper

Voices

H...D...; #745212; Male; Age 19; White; Single.

DIAGNOSIS: Epilepsy - post-traumatic.

Five months ago, while carrying a log on his shoulder, the patient slipped in the snow and fell. The log hit one side of his head, the other side striking a rock when he fell. He was dazed for two or three minutes and then completed his work. Three weeks later he began having convulsive seizures which always occurred when he was in bed. He would awaken with a feeling of dizziness followed by a generalized shaking lasting for about five minutes. They were not accompanied by incontinence nor biting of the tongue and were not followed by sleepiness. A total of about eight have occurred, some with unconsciousness. He now feels more drowsy and believes his mental activity is definitely slowed. Dizzy spells have occurred since the accident but are now less frequent than formerly.

PHYSICAL EXAMINATION: The patient presents an asthenic appearance but is not apparently in acute distress. The skin seems excessively oily.

NEUROLOGICAL EXAMINATION: Mental reactions are slow and there is a lack of initiative. There is a suggestive left facial weakness with questionable nystagmus. The neck and face are markedly flushed. The abdominals and cremasterics are diminished. Moderate sinus arrhythmia, marked dermographic and pilomotor response, and ciliospinal reflex.

URINE: Amber; acid; ap. gr. 1021; no sugar nor albumen.

BLOOD: 90% Hgb.; 5,000,000 R.B.C.; 6,000 W.B.C.; N.P.N. 27; B.S. 89; Kahn negative; pressure 110/80.

LUMBAR PUNCTURE: I.P. 110; dynamics normal; 15 cc. removed; F.P. 50; appearance normal; positive Pandy; protein 39 mg/100 cc.; gold sol 1111100000.

Encephalography showed no abnormality of the filling of the ventricles. Trauma probably precipitated a psychogenic stigmata already present.

H...D...; 748212; Male; Age 19; White; Single.

DIAGNOSIS: Epilepsy - post-traumatic.

Five months ago, while carrying a log on his shoulder, the patient slipped in the snow and fell. The log hit one side of his head, the other side striking a rock when he fell. He was dazed for two or three minutes and then completed his work. Three weeks later he began having convulsive seizures which always occurred when he was in bed. He would awaken with a feeling of dizziness followed by a generalized shaking lasting for about five minutes. They were not accompanied by incontinence nor biting of the tongue and were not followed by sleepiness. A total of about eight have occurred, some with unconsciousness. He now feels more drowsy and believes his mental activity is definitely slowed. Dizzy spells have occurred since the accident but are now less frequent than formerly.

PHYSICAL EXAMINATION: The patient presents an asthenic appearance but is not

apparently in acute distress. The skin seems excessively oily.

NEUROLOGICAL EXAMINATION: Mental reactions are slow and there is a lack of

initiative. There is a suggestive left facial weakness with questionable

spasm. The neck and face are markedly flushed. The abdominal and

cremasteric are diminished. Moderate sinus arrhythmia, marked dermatographic

and pilomotor response, and oculocephalic reflex.

URINE: Amber; acid; sp. gr. 1.021; no sugar nor albumen.

BLOOD: 90% Hgb.; 5,000,000 R.B.C.; 4,000 W.B.C.; R.P.R. 27; E.S. 22; Kahn

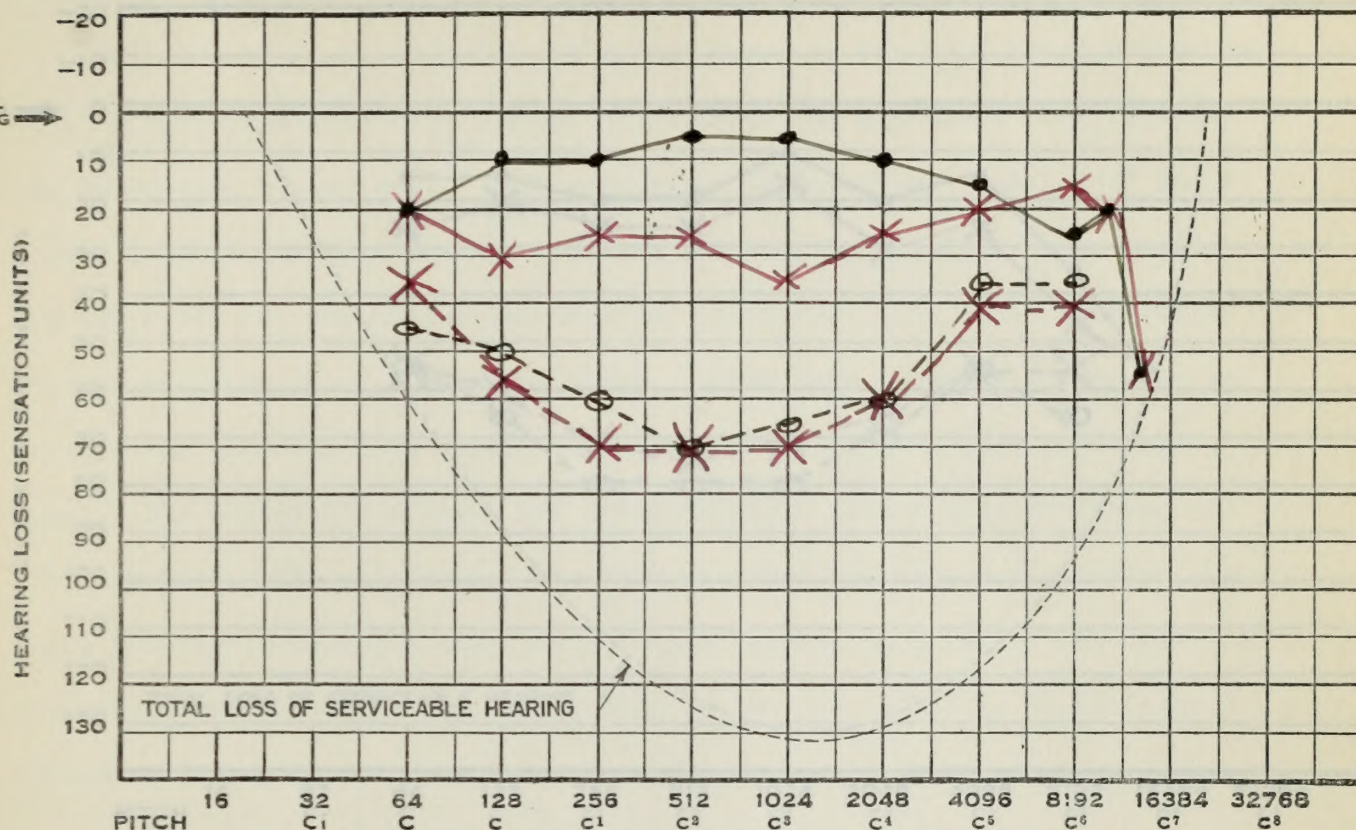
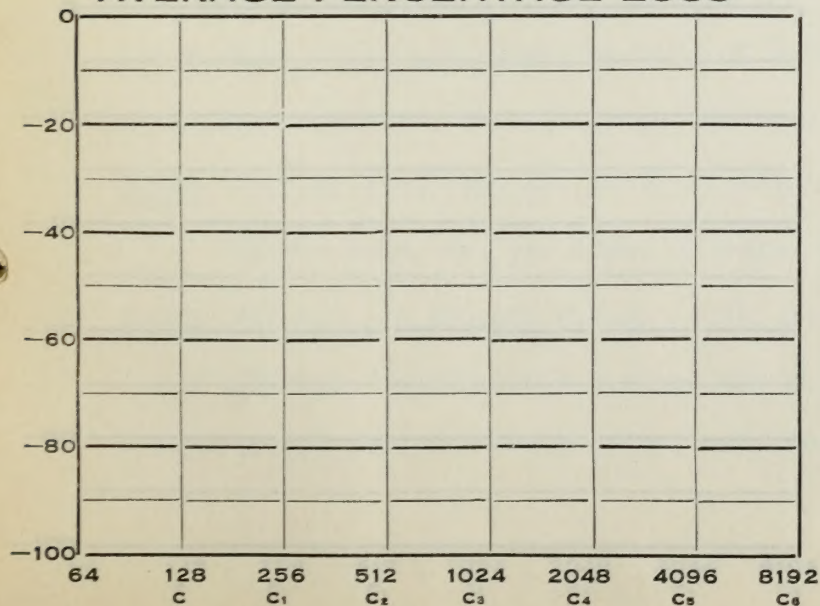
negative; pressure 110/80.

URINARY FUNCTION: I.P. 110; dynamics normal; 15 cc. removed; R.P. 50; appar-

ance normal; positive Pandey; protein 32 mg/100 cc.; gold sol 1111100000.

Encephalography showed no abnormality of the filling of the ventricles.

Traces probably precipitated a psychomotoric attack already present.

EVANS MEMORIAL**AUDIOGRAM**NAME M. S. 728893
DATE Nov. 17 19 33**AVERAGE PERCENTAGE LOSS**Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain
3. Discharge.....
4. Tinnitus
5. Headache
6. Dizziness

Right

Left

Rinne AC
BC

Weber

Upper Limit.....

Lower Limit.....

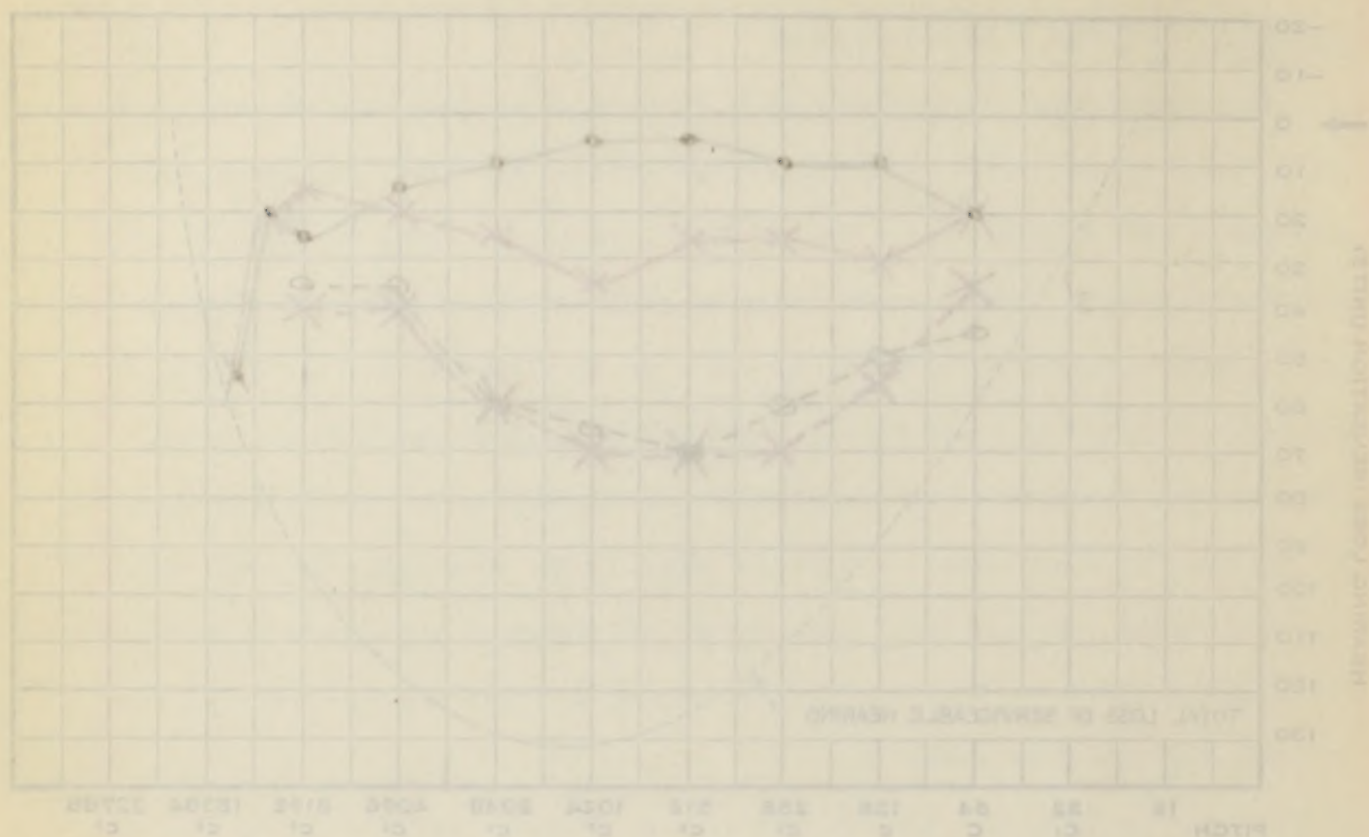
Whisper.....

Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME M. S. 728893
DATE May 17, 1933



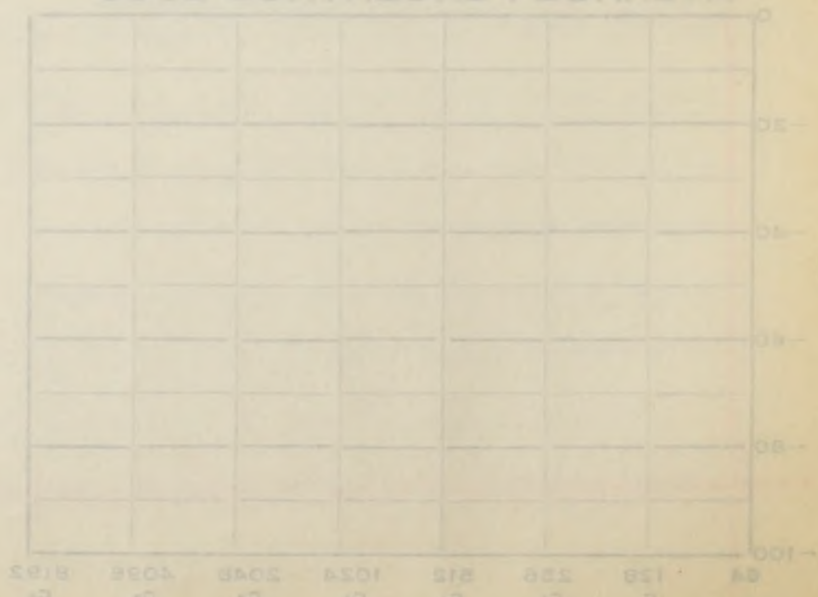
Frequency in cycles per second

Right Ear

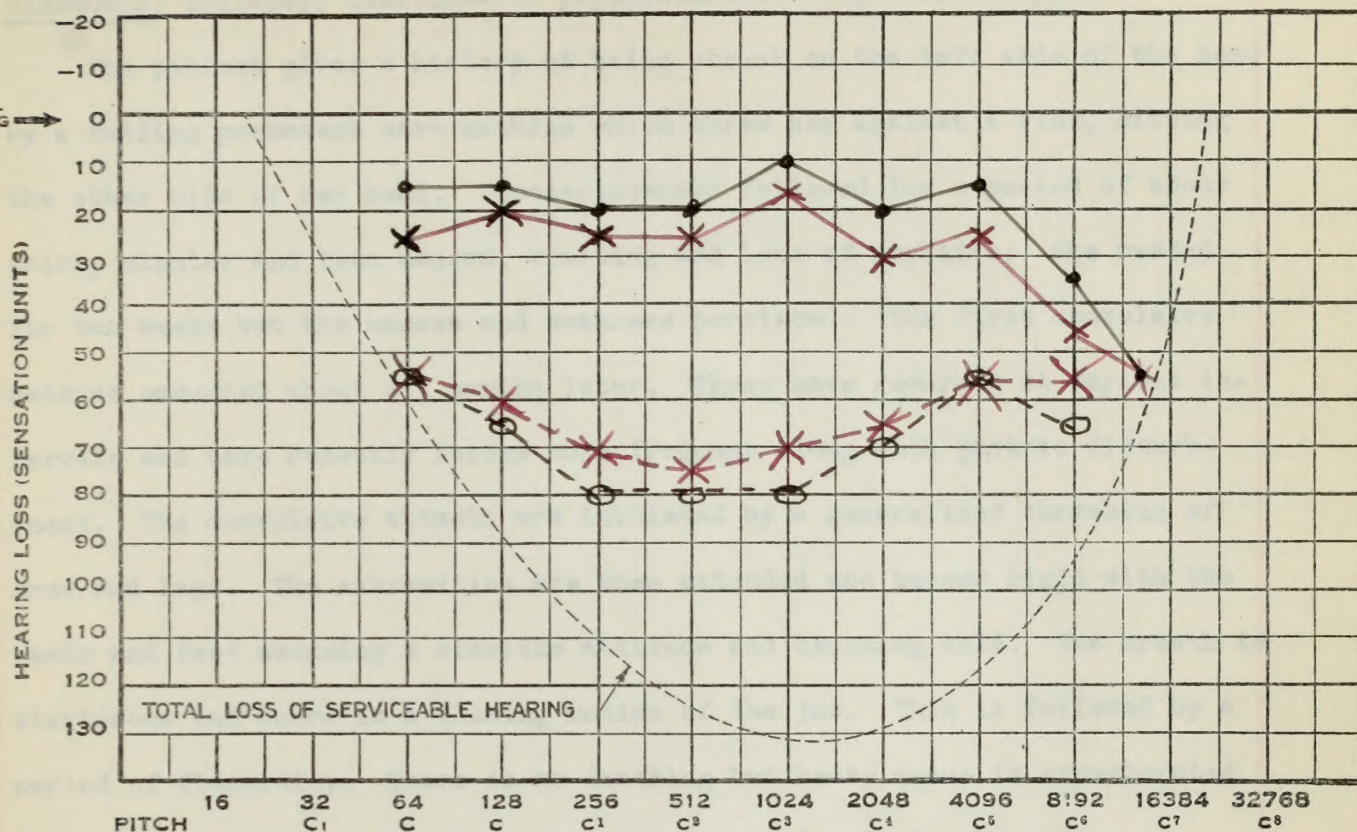
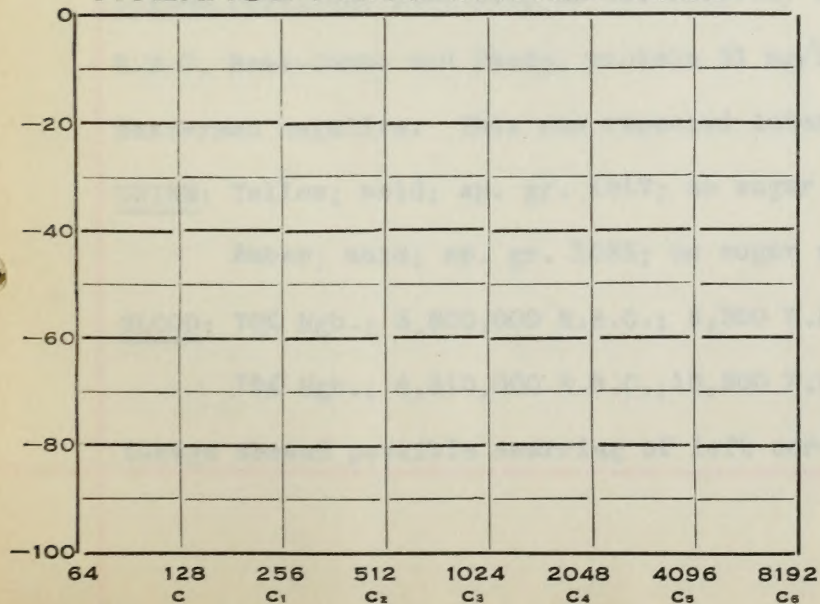
Left Ear

Webster = 4 pints

AVERAGE PERCENTAGE LOSS



Diagnosis _____
 Date _____
 Chief Complaint _____
 1. History _____
 2. Exam _____
 3. Treatment _____
 4. Prognosis _____
 5. Remarks _____
 6. Discharge _____
 Name _____
 Age _____
 Sex _____
 Occupation _____
 Present Illness _____
 Past History _____
 Family History _____
 Social History _____
 Physical Examination _____
 Laboratory Tests _____
 X-ray _____
 Pathology _____
 Microbiology _____
 Special Studies _____
 Summary _____
 Conclusion _____
 Recommendations _____
 Follow-up _____

EVANS MEMORIAL**AUDIOGRAM**NAME M.S. 728893
DATE..... 19.....*Pre operative.**Weber = 4 Points.***AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

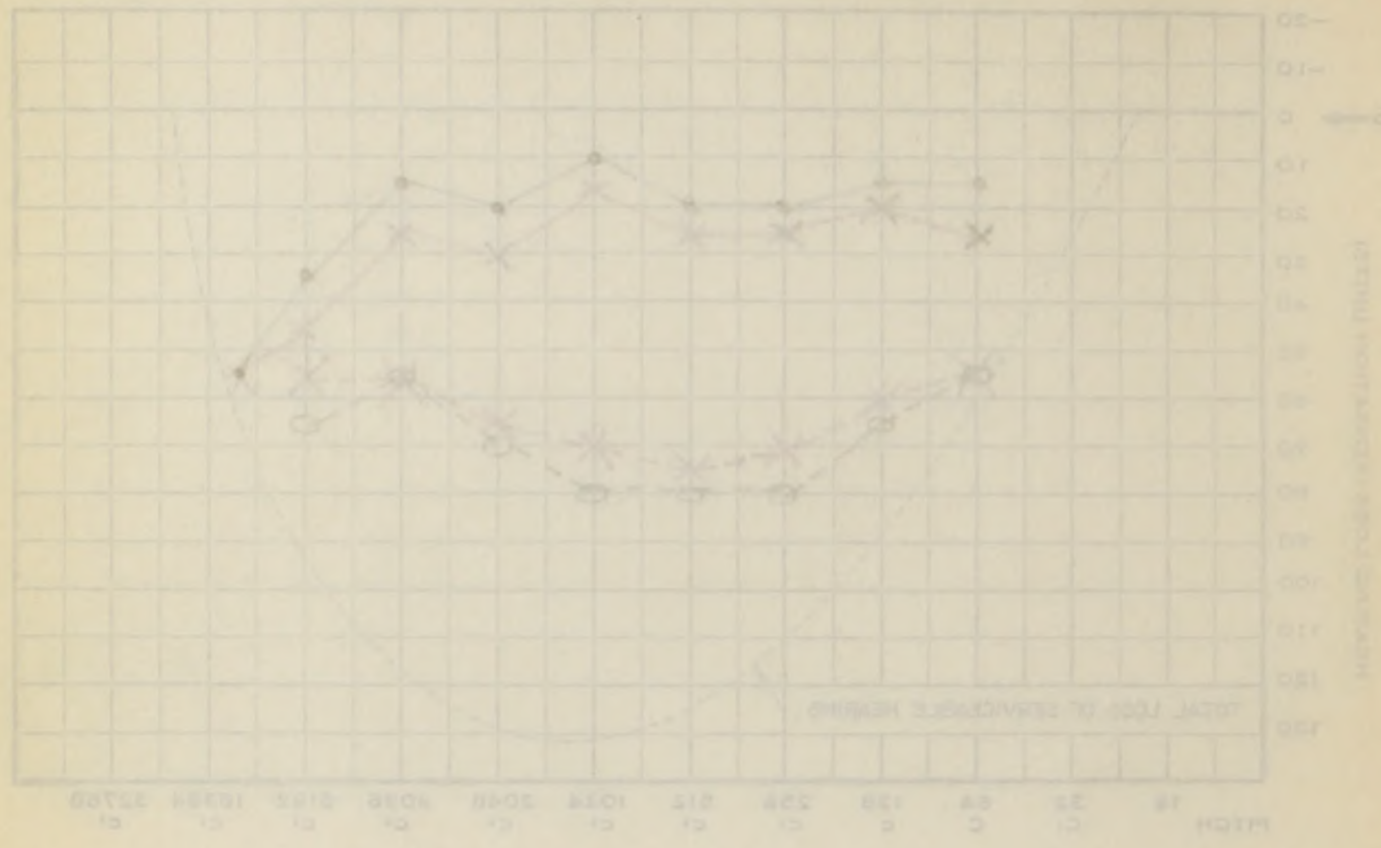
EVANS MEMORIAL

M.S. 728893

AUDIOGRAM

NAME
DATE

10

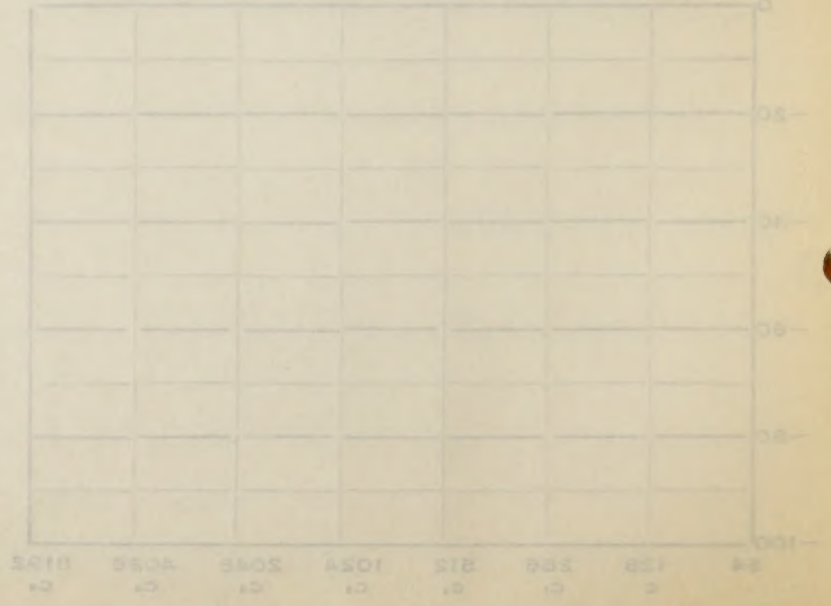


Frequency Hearing Loss
Right Ear
Left Ear

Pre operative

Weber = 4 Points

AVERAGE PERCENTAGE LOSS



Diagnosis
Disease
Chief Complaint
1. History
2. Vitals
3. Physical
4. Labs
5. History
6. Diet
Right
Left
Risks
Wet
Type
Lent
Vitals
Notes

M...S...; #728,893; Female; Age 20; White; Single.

DIAGNOSIS: Epilepsy; questionable psychoneurosis - hysterical type.

The patient gives a history of being struck on the left side of the head by a falling permanent wave machine which threw her against a sink, hitting the other side of her head. Unconsciousness followed for a period of about thirty minutes and then nausea, vomiting and loss of appetite. She rested for two weeks but the nausea and weakness persisted. The first convulsive seizure occurred about six months later. These have recurred at various intervals and have recently become more frequent along with gastric disturbances. The convulsive attacks are initiated by a generalized thrashing of arms and legs. The extremities are then extended and become rigid with the hands and feet assuming a clawlike attitude and becoming cold. The breath is stertorous and there is a chewing motion of the jaw. This is followed by a period of flaccidity. There is no frothing but heavy mucus is expectorated following an attack. They last from thirty minutes to two hours.

PHYSICAL EXAMINATION: Tonsils are removed, with considerable scarring. The heart shows a slight sinus arrhythmia with a pulse rate of only 66.

NEUROLOGICAL EXAMINATION: There is a coarse horizontal and a fine vertical nystagmus and a generalized hypotonia of both arms and legs.

LUMBAR PUNCTURE: I.P. 150; 10 cc. removed; F.P. 60; 3 W.B.C.; 0 polys; 0 R.B.C., Ross-Jones and Pandy; protein 31 mg/100 cc.; gold sol 0011100000; Wasserman negative. This was repeated later with the same results.

URINE: Yellow; acid; sp. gr. 1017; no sugar nor albumen.

Amber; acid; sp. gr. 1025; no sugar nor albumen.

BLOOD: 70% Hgb.; 3,900,000 R.B.C.; 8,300 W.B.C.; slight achromia; pr. 98/50.

75% Hgb.; 4,410,000 R.B.C.; 10,900 W.B.C.; N.P.N. 25; B.S. 60.

X-rays showed possible scarring of left cortex so operation was decided upon.

X-rays showed possible scarring of left cortex so operation was decided upon.

VSX Hgb.: 4,410,000 R.B.C.: 10,200 W.B.C.: R.P.R. 25; S.E. 80.

BLOOD: TOR Hgb.: 5,800,000 R.B.C.: 8,300 W.B.C.: slight abnormal; Cr. 98/50.

Aspart. acid; sp. Cr. 1025; no sugar nor albumen.

URINE: Yellow; acid; sp. Cr. 1017; no sugar nor albumen.

Wassermann negative. This was repeated later with the same results.

R.B.C.: Rose-Jones and Bangs; protein 31 mg/100 cc.; Gold and Golligorsky;

LEUKOCYTES: 17,150; 10 cc. removed; P.P. 80; S.W.B.C.: 0 polys; 0

lymphs and a generalized hypochromia of both arms and legs.

NEUROLOGICAL EXAMINATION: There is a coarse horizontal and a fine vertical

heart shows a slight sinus arrhythmia with a pulse rate of only 63.

PHYSICAL EXAMINATION: Tonsils are retracted, with considerable scarring. The

following an attack. They last from thirty minutes to two hours.

period of consciousness. There is no frothing but heavy sweats are expected

abdomen and there is a shivering motion of the jaw. This is followed by a

hands and feet assuming a clawlike attitude and becoming cold. The pressure in

arms and legs. The extremities are then extended and become rigid with the

arms. The convulsive attacks are initiated by a generalized thrashing of

arms and have recently become more frequent along with gastric distur-

seizure occurred about six months later. There have occurred at various in-

for two weeks but the nausea and weakness persisted. The first convulsive

thirty minutes and then nausea, vomiting and loss of appetite. She rested

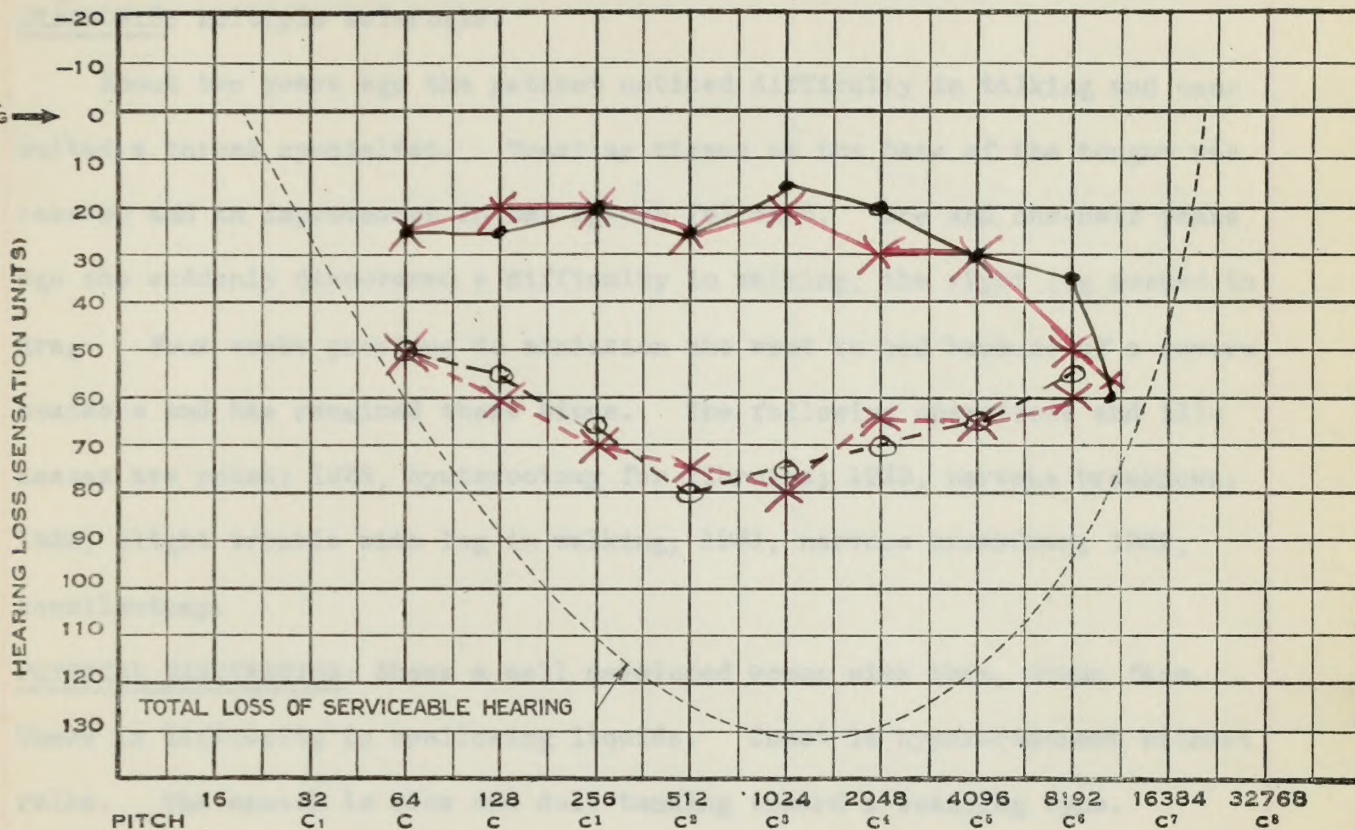
the other side of her head. Unconsciousness followed for a period of about

by a falling permanent wave machine which threw her against a sink, hitting

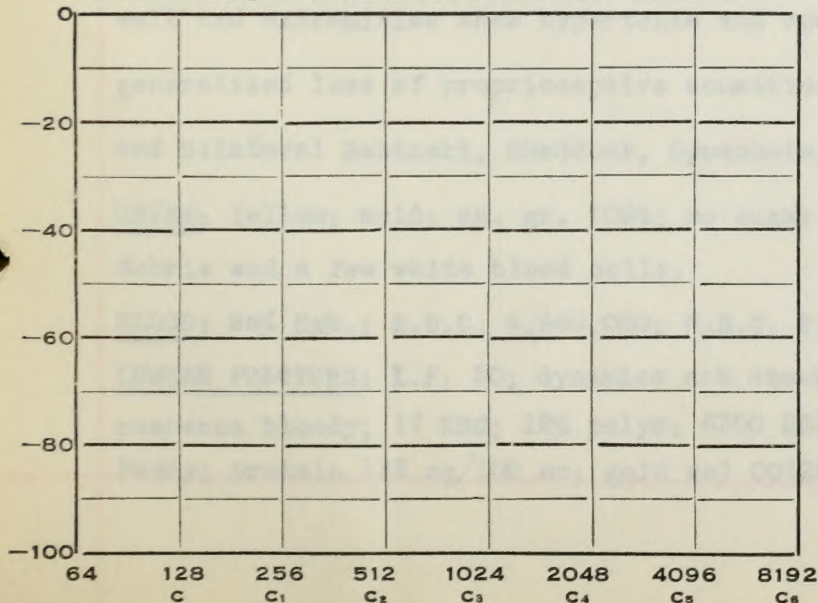
The patient gives a history of being struck on the left side of the head

DIAGNOSIS: Epilepsy; questionable psychoneurosis - hysterical type.

M...S...; 4752, 1932; W...; Age 20; White; Single.

EVANS MEMORIAL**AUDIOGRAM**NAME G. M. S. 739660
DATE 19

Weber = 4 Points.

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain
3. Discharge.....
4. Tinnitus
5. Headache
6. Dizziness

Right Left

Rinne $\frac{AC}{BC}$

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

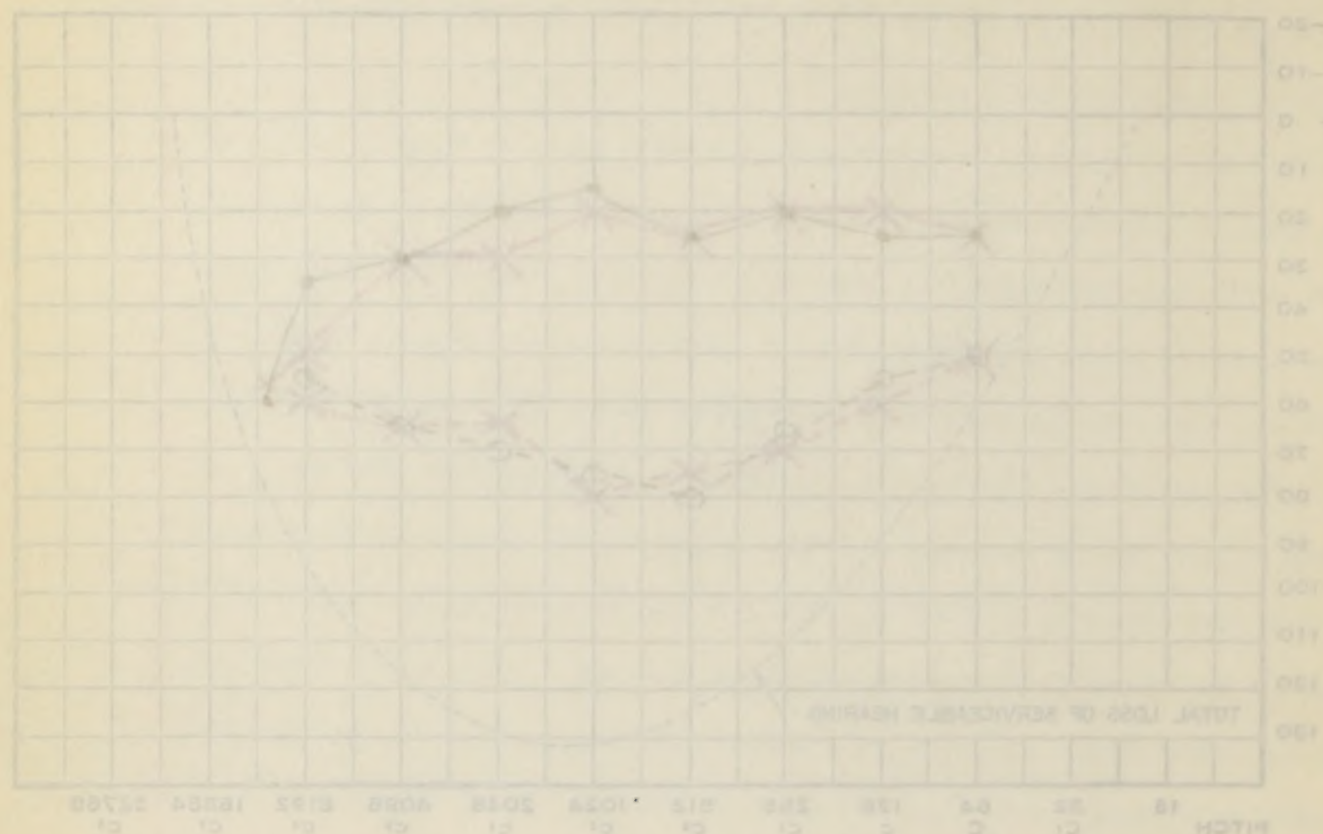
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

G.M.S. 739660

13



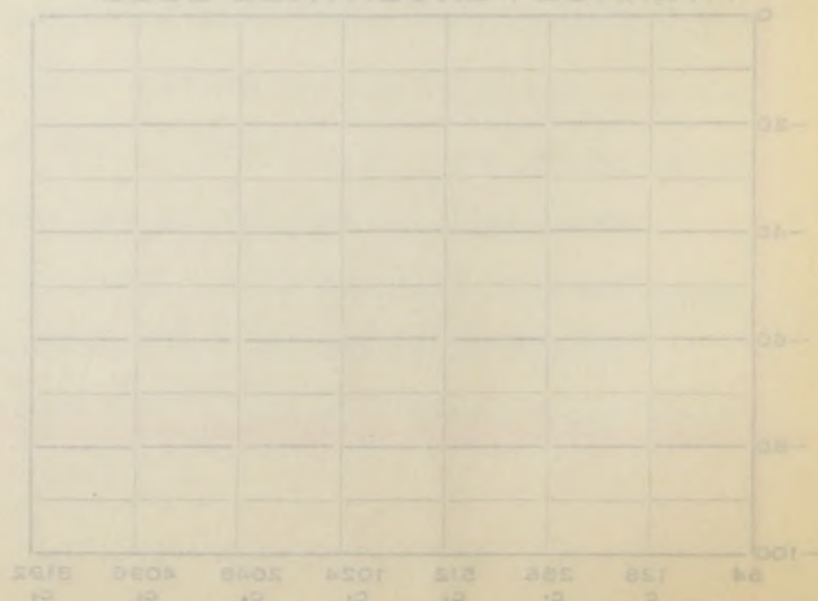
Frequency Hearing Loss

Right Ear

Left Ear

Weber = N Points

AVERAGE PERCENTAGE LOSS



Disease _____
 Location _____
 Chief Symptom _____
 1. Deafness _____
 2. Pain _____
 3. Tinnitus _____
 4. Vertigo _____
 5. Headache _____
 6. Distress _____
 Right _____
 Left _____
 Ear AC _____
 Bone _____
 Upper Limb _____
 Lower Limb _____
 Voice _____
 Other _____

G...M...S..., #739,660; Female, Age 43, White, Married.

DIAGNOSIS: Multiple sclerosis.

About two years ago the patient noticed difficulty in talking and consulted a throat specialist. Tonsillar tissue at the base of the tongue was removed and an improvement in her speech followed. One and one-half years ago she suddenly discovered a difficulty in walking, the right leg seemed to drag. Four weeks previous to admission she went to bed because of a severe headache and has remained there since. The following operations and illnesses are noted: 1928, hysterectomy for fibroids; 1929, nervous breakdown; 1930, slight trouble with leg in walking; 1931, nervous breakdown; 1932, tonsilectomy.

PHYSICAL EXAMINATION: Shows a well developed woman with thin, drawn face.

There is difficulty in swallowing liquids. Chest is hyper-resonant without rales. The speech is slow and dull tending toward a scanning type.

NEUROLOGICAL EXAMINATION: There is a thin, apathetic appearance of the face, with some emotional instability. The memory is poor. Visual acuity diminished but is able to read with glasses. Discs show a temporal pallor and a rhythmic, rapid nystagmus is present. There is a questionable weakness of the seventh nerve. Palate deviates to left on phonation. She is unable to walk and extremities show hypertonia and spasticity. There is a somewhat generalized loss of proprioceptive sensations. There is a positive Hoffman and bilateral Babinski, Chaddock, Oppenheim; Gordon-Holmes only on left.

URINE: Yellow; acid; sp. gr. 1024; no sugar nor albumen; sediment shows debris and a few white blood cells.

BLOOD: 84% Hgb.; R.B.C. 4,560,000; W.B.C. 9,900; N.P.N. 25; B.S. 83.

LUMBAR PUNCTURE: L.P. 50; dynamics not checked; 15 cc. removed; F.P. 30; appearance bloody; 17 WBC; 12% polys; 6300 RBC; negative Ross-Jones; positive Pandy; protein 132 mg/100 cc; gold sol 0012221000; Wasserman negative.

G.W.S., 43, Female, Age 43, White, Married.

DIAGNOSIS: Multiple sclerosis.

About two years ago the patient noticed difficulty in talking and consulted a throat specialist. Tonsillar tissue at the base of the tongue was removed and an improvement in her speech followed. One and one-half years ago she suddenly discovered a difficulty in walking, the right leg seemed to drag. Four weeks previous to admission she went to bed because of a severe headache and has remained there since. The following operations and illnesses are noted: 1928, hysterectomy for fibroids; 1929, nervous breakdown; 1930, slight trouble with leg in walking; 1931, nervous breakdown; 1932, tonsillectomy.

PHYSICAL EXAMINATION: Shows a well developed woman with thin, green face.

There is difficulty in swallowing liquids. Chest is hyper-resonant without rales. The speech is slow and dull tending toward a scanning type.

NEUROLOGICAL EXAMINATION: There is a thin, spastic appearance of the face,

with some emotional instability. The memory is poor. Visual acuity diminished but is able to read with glasses. Discs show a temporal pallor and a rhythmic, rapid nystagmus is present. There is a questionable weakness of the seventh nerve. Palate deviates to left on phonation. She is unable to walk and extremities show hyperreflexia and spasticity. There is a somewhat generalized loss of proprioceptive sensations. There is a positive Hoffman and bilateral Babinski, Chaddock, Oppenheim; Gordon-Holmes only on left.

URINE: Yellow; acid; sp. gr. 1024; no sugar; not albumen; sediment shows

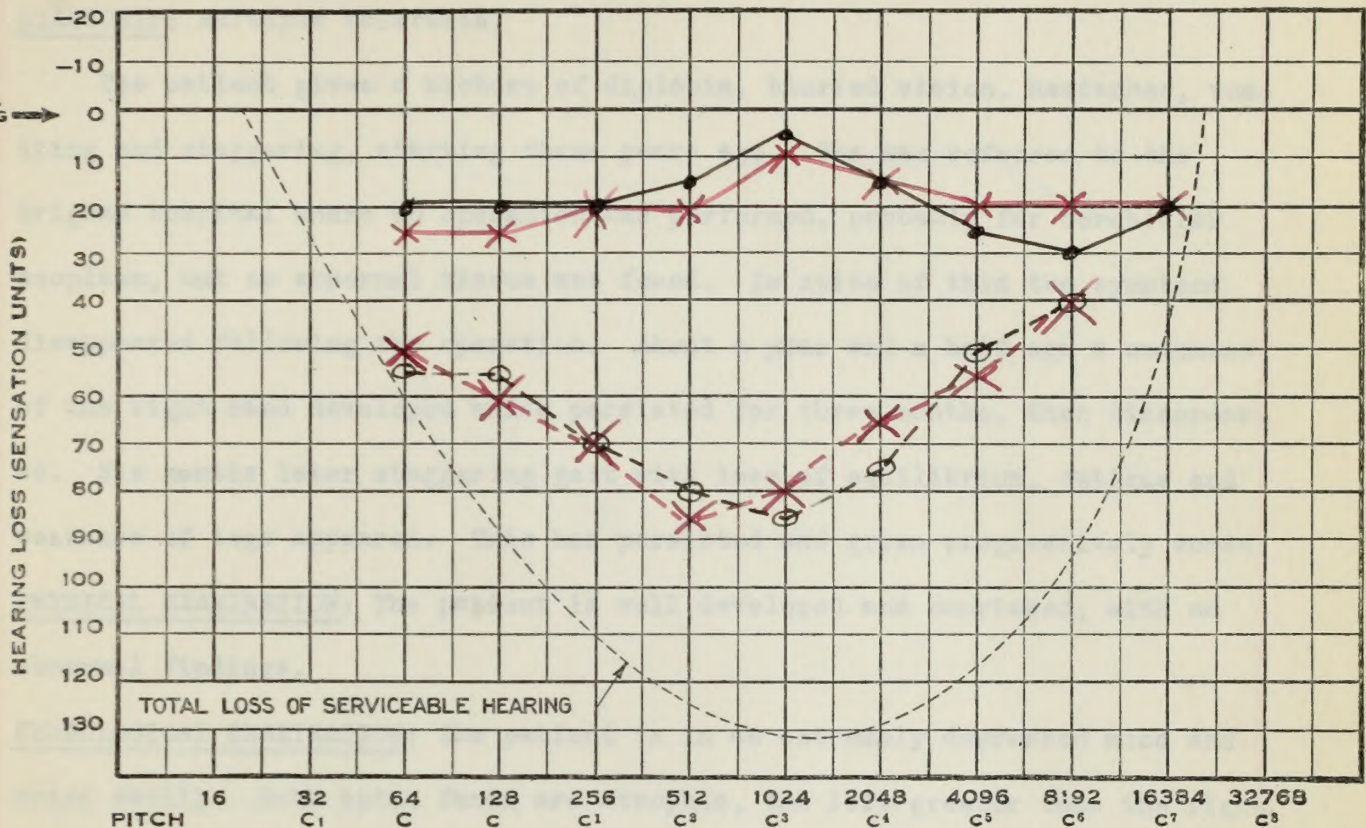
debris and a few white blood cells.

BLOOD: 84% Hgb.; R.B.C. 4,550,000; W.B.C. 9,200; E.P.C. 25; E.S. 83.

LUMBAR PUNCTURE: I.P. 50; dynamics not checked; 15 cc. removed; P.P. 30; sp-

pearance bloody; 14 WBC; 12E poly; 5300 RBC; negative Ross-Jones; positive

Randy; protein 132 mg/100 cc; acid and 001221000; Wasserman negative.

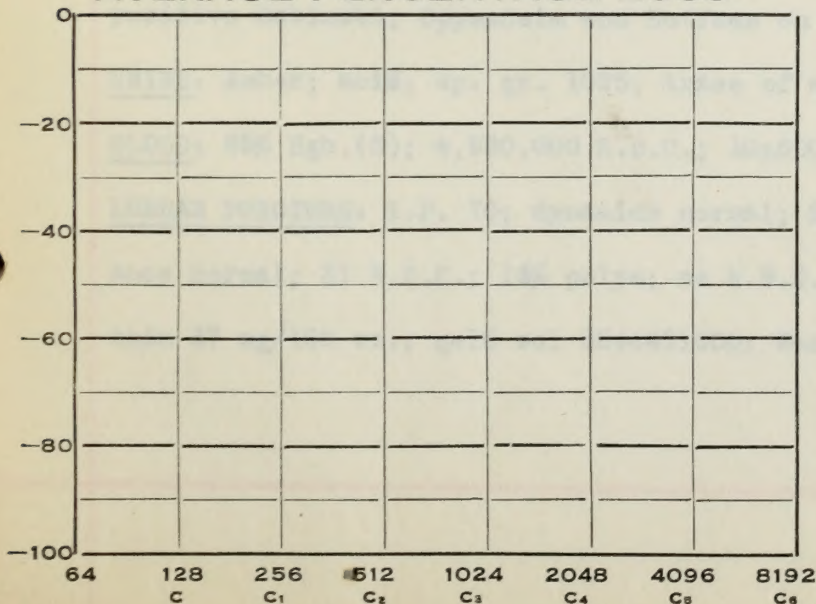
EVANS MEMORIAL**AUDIOGRAM**NAME C.K. 734834
DATE 19

Percentage Hearing Loss

Right Ear

Left Ear

Weber Right 4 Points

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

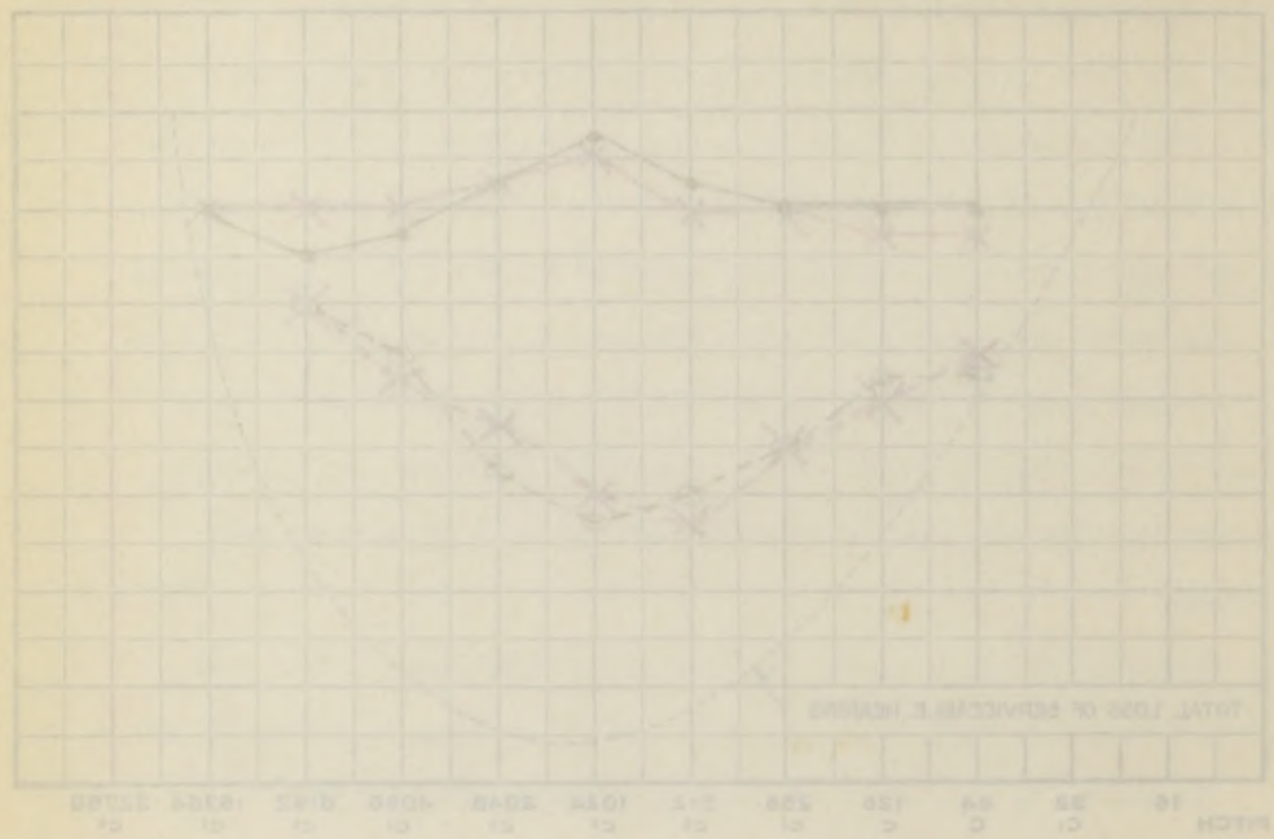
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

C.R.

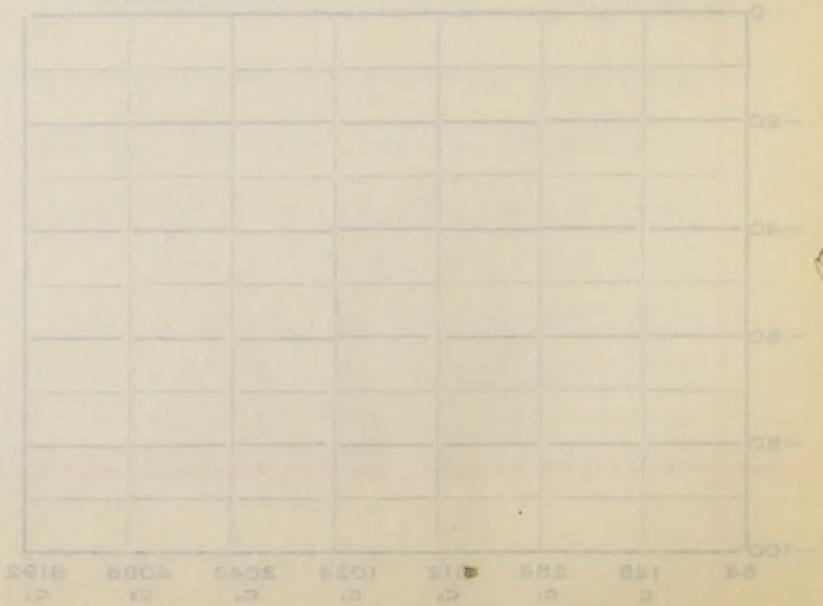
734834



Frequency Hearing Loss
Right Ear
Left Ear

Webster Right 4 points

AVERAGE PERCENTAGE LOSS



Diagnosis
Duration
Chief Symptom
1. Position
2. Pain
3. Discharge
4. Tinnitus
5. Hearing
6. Dizziness
7. Other

Right
Left

Examination
History
Physical
Laboratory
X-ray
Other

K...L...K...; #734,834; Female; Age 26; White; Single.

DIAGNOSIS: Multiple sclerosis.

The patient gives a history of diplopia, blurred vision, headaches, vomiting and staggering, starting three years ago. She was referred to the Brigham hospital where an operation was performed, probably for cerebellar neoplasm, but no abnormal tissue was found. In spite of this the symptoms disappeared following the operation. About a year and a half ago a weakness of the right hand developed which persisted for three months, then disappeared. Six months later staggering gait with loss of equilibrium, fatigue and weakness of legs appeared. This has persisted and grown progressively worse.

PHYSICAL EXAMINATION: The patient is well developed and nourished, with no abnormal findings.

NEUROLOGICAL EXAMINATION: The patient is in an extremely depressed mood and cries easily. Both optic fundi are atrophic, the left greater than the right. There is a ptosis of the left eyelid and left facial weakness to voluntary movement. The palpebral and nasal labial fissures are deeper on the right. Both horizontal and vertical nystagmus is present. There is an intention tremor; poor posture, with marked swaying; and the head is bent toward the left and backward. The patient cannot stand with the eyes closed. There is positive Babinski, Oppenheim and Hoffman on the right with bilateral Chaddock.

URINE: Amber; acid; sp. gr. 1025; trace of albumen; no sugar.

BLOOD: 85% Hgb.(S); 4,530,000 R.B.C.; 10,800 W.B.C.; Kahn negative; pr.110/70.

LUMBAR PUNCTURE: I.P. 70; dynamics normal; 20 cc. removed; F.P. 30; appearance normal; 21 W.B.C.; 13% polys; no R.B.C.; Ross-Jones nor Pandy; protein 27 mg/100 cc.; gold sol 5544431000; Wasserman negative.

E...I...K...; 4734, 554; Female; Age 28; White; Single.

DIAGNOSIS: Multiple sclerosis.

The patient gives a history of diplopia, blurred vision, headaches, vomiting and staggering, starting three years ago. She was referred to the Brigham Hospital where an operation was performed, probably for cerebellar neoplasia, but no abnormal tissue was found. In spite of this the symptoms disappeared following the operation. About a year and a half ago a weakness of the right hand developed which persisted for three months, then disappeared. Six months later staggering gait with loss of equilibrium, fatigue and weakness of legs appeared. This has persisted and grown progressively worse.

PHYSICAL EXAMINATION: The patient is well developed and nourished, with no abnormal findings.

NEUROLOGICAL EXAMINATION: The patient is in an extremely depressed mood and cries easily. Both optic fundi are atrophic, the left greater than the right. There is a ptosis of the left eyelid and left facial weakness to voluntary movement. The palpebral and nasal labial flaccidity are deeper on the right. Both horizontal and vertical nystagmus is present. There is an intention tremor; poor posture, with marked swayback; and the head is bent forward the left and backward. The patient cannot stand with the eyes closed. There is positive Babinski, Oppenheim and Hoffman on the right with bilateral Chaddock.

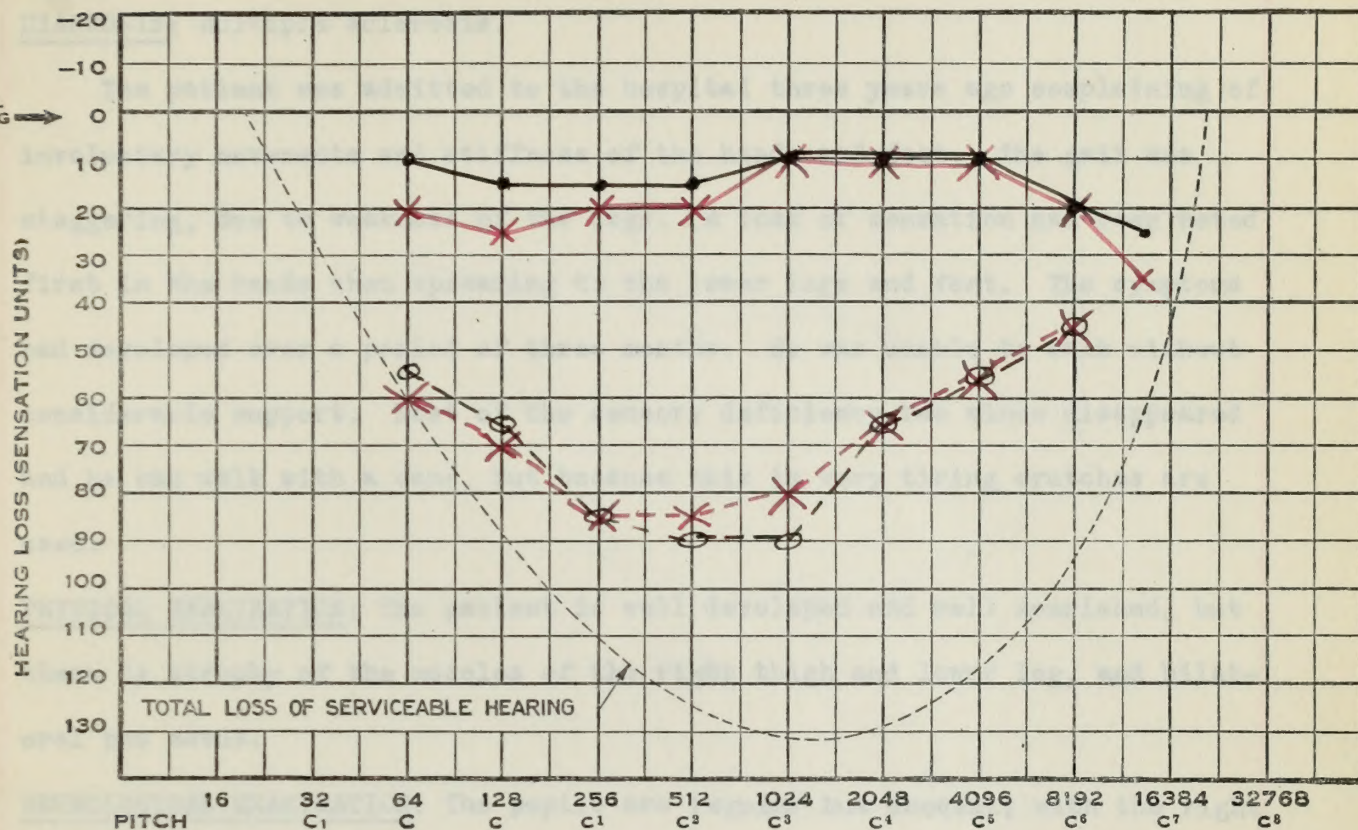
URINE: Amber; acid; sp. gr. 1.025; trace of albumen; no sugar.

BLOOD: 85% Hgb. (E); 4,230,000 R.B.C.; 10,800 W.B.C.; Kahn negative; ur. 110/70.

HUMAN FUNCTION: I.P. 70; dynamics normal; 20 cc. removed; 2.P. 30; appear-

ance normal; 21 W.B.C.; 13% polym; no R.B.C.; Rosen-Jones not ready; pro-

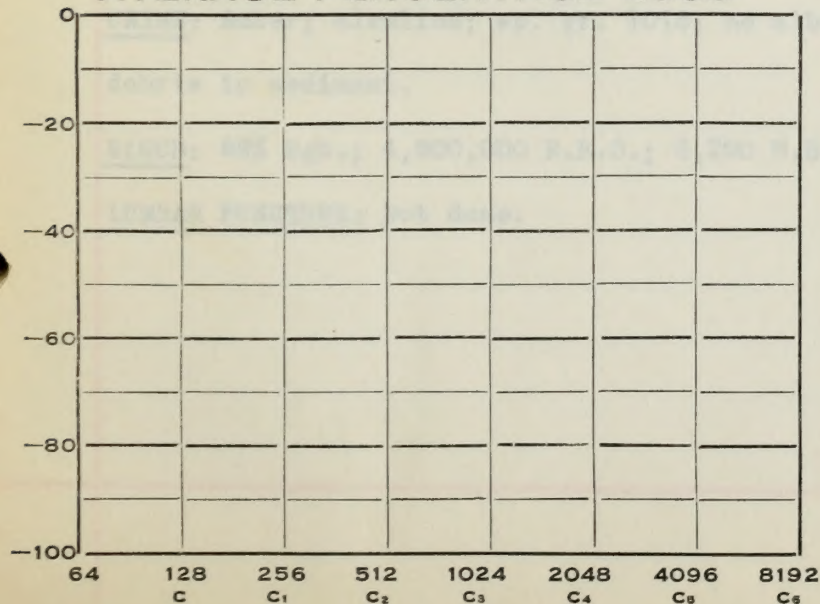
tein 27 mg/100 cc.; Gold sol 5544431000; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**NAME C. J. C. 746268
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber right { Vertex
Forehead
Left { Nose Bridge
chin.

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

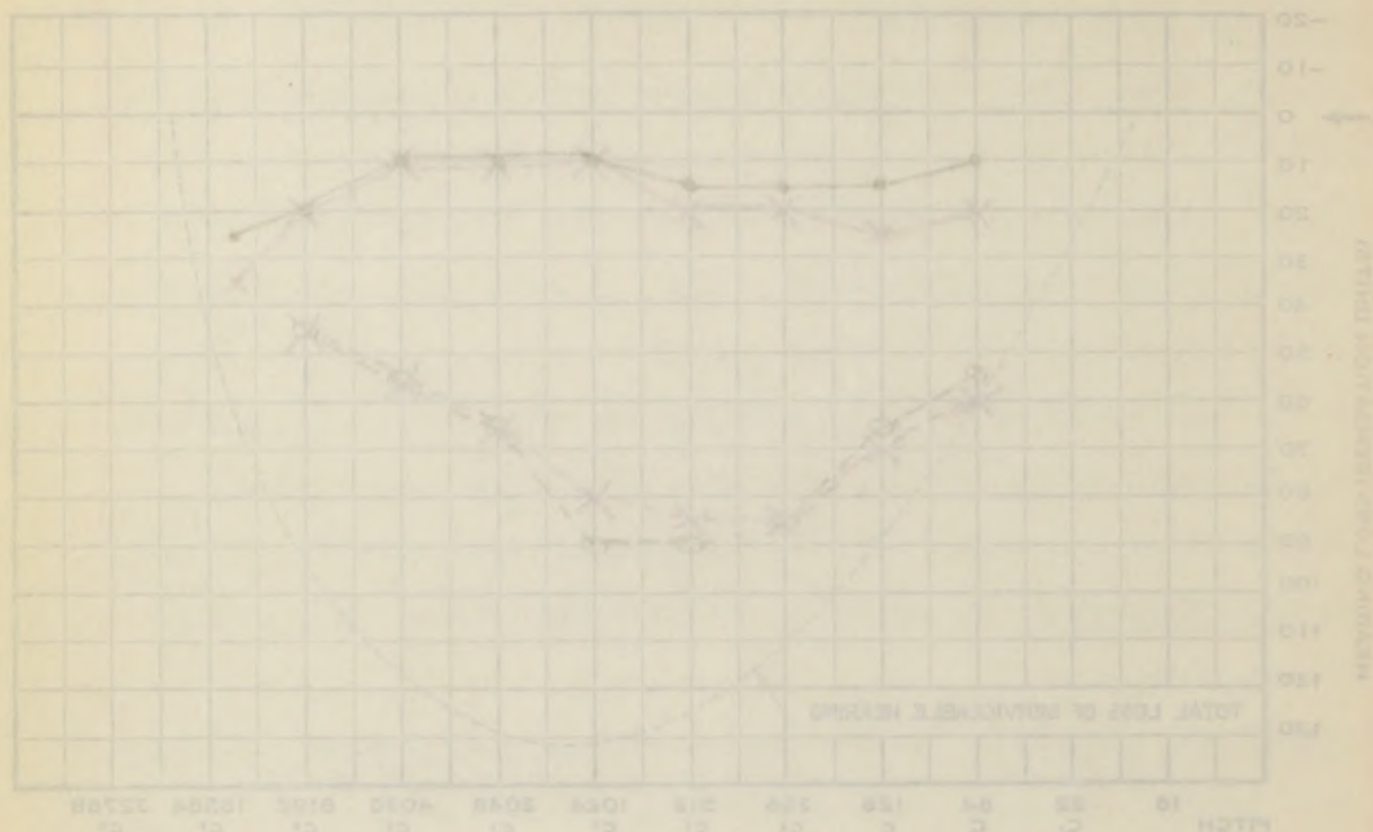
Whisper

Voice

EVANS MEMORIAL

AUDIOGRAM

NAME C. J. G. 746 248
DATE 12

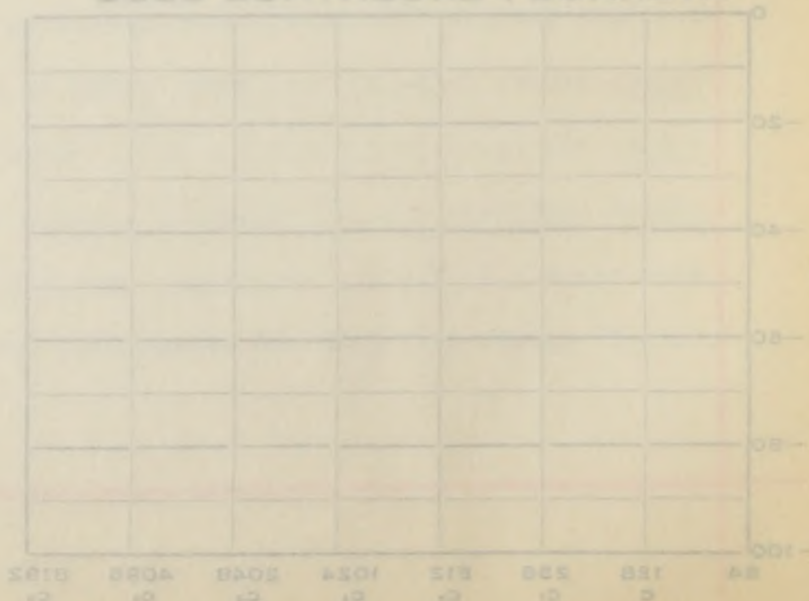


Frequency Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Diagnosis

Observation

Chief Complaint

1. Tinnitus

2. Pain

3. Deafness

4. Vertigo

5. Headache

6. Dizziness

History

Lab

Rinne

Water

Upper Limb

Lower Limb

Waist

Voice

Weber right / Vertex
Left / Noise Bridge
Gain

C...J...C...; #746,268; Male; Age 29; White; Single.

DIAGNOSIS: Multiple sclerosis.

The patient was admitted to the hospital three years ago complaining of involuntary movements and stiffness of the hands and feet. The gait was staggering, due to weakness of the legs. A loss of sensation had been noted first in the hands then spreading to the lower legs and feet. The symptoms had developed over a period of three months. He was unable to walk without considerable support. Most of the sensory deficiency has since disappeared and he can walk with a cane, but because this is very tiring crutches are used.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, but there is atrophy of the muscles of the right thigh and lower leg, and bilateral pes cavus.

NEUROLOGICAL EXAMINATION: The pupils are regular but unequal, with the right greater than the left, both reacting well to light and accommodation. There is a generalized tendon hyperreflexia with bilateral ankle clonus, Babinski, Oppenheim and Chaddock. Abdominals and cremasterics are absent. Vibratory sensation is much diminished in both legs, while the finger to nose and heel to shin movements are incoordinated.

URINE: Amber; alkaline; sp. gr. 1018; no albumen; some sugar; bacteria and debris in sediment.

BLOOD: 88% Hgb.; 4,600,000 R.B.C.; 6,200 W.B.C.; Kahn negative; pr. 110/70.

LUMBAR PUNCTURE: Not done.

C...J...C...; 474C, 258; Male; Age 23; White; Single.

DIAGNOSIS: Multiple sclerosis.

The patient was admitted to the hospital three years ago complaining of involuntary movements and stiffness of the hands and feet. The gait was staggering, due to weakness of the legs. A loss of sensation had been noted first in the hands then spreading to the lower legs and feet. The symptoms had developed over a period of three months. He was unable to walk without considerable support. Most of the sensory deficiency has since disappeared and he can walk with a cane, but because this is very tiring crutches are used.

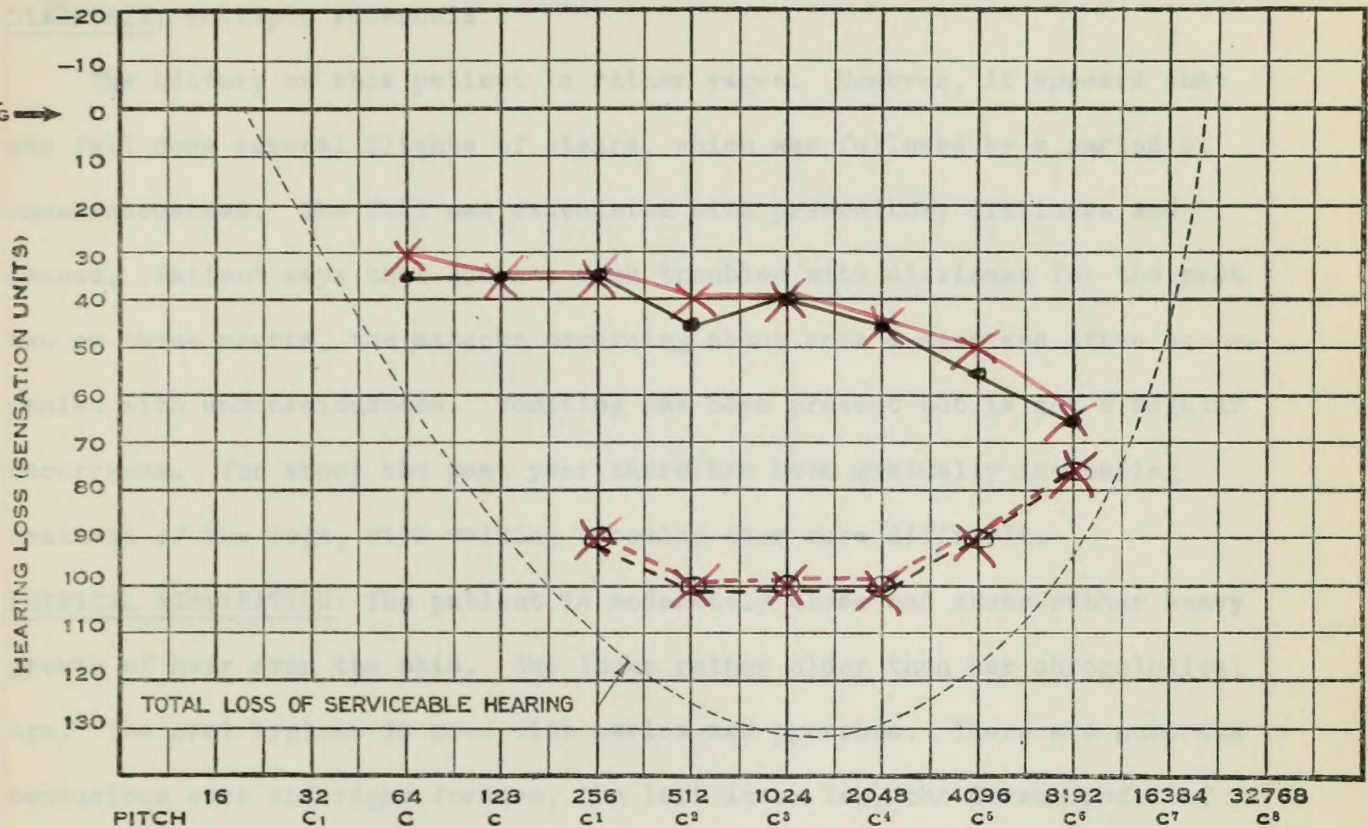
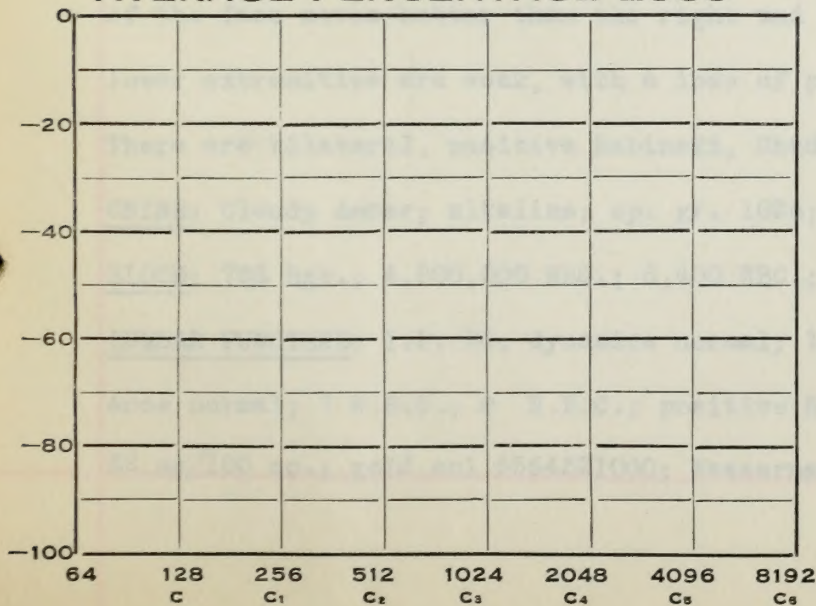
PHYSICAL EXAMINATION: The patient is well developed and well nourished, but there is atrophy of the muscles of the right thigh and lower leg, and slight oral pes cavus.

NEUROLOGICAL EXAMINATION: The pupils are regular but unequal, with the right greater than the left, both reacting well to light and accommodation. There is a generalized tendon hyperreflexia with bilateral ankle clonus, Babinski, Oppenheim and Chaddock. Abdominals and cremasterics are absent. Vibratory sensation is much diminished in both legs, while the finger to nose and heel to shin movements are incoordinated.

URINE: Amber, alkaline; sp. gr. 1.018; no albumen; some sugar; bacteria and debris in sediment.

BLOOD: 885 Hgb.; 4,800,000 R.B.C.; 8,500 W.B.C.; Kahn negative; pr. 110/70.

LUMBAR PUNCTURE: Not done.

EVANS MEMORIAL**AUDIOGRAM**NAME A.D. 745310
DATE 19**AVERAGE PERCENTAGE LOSS**Disease
Duration
Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

Rinne AC

BC

Weber

Upper Limit

Lower Limit

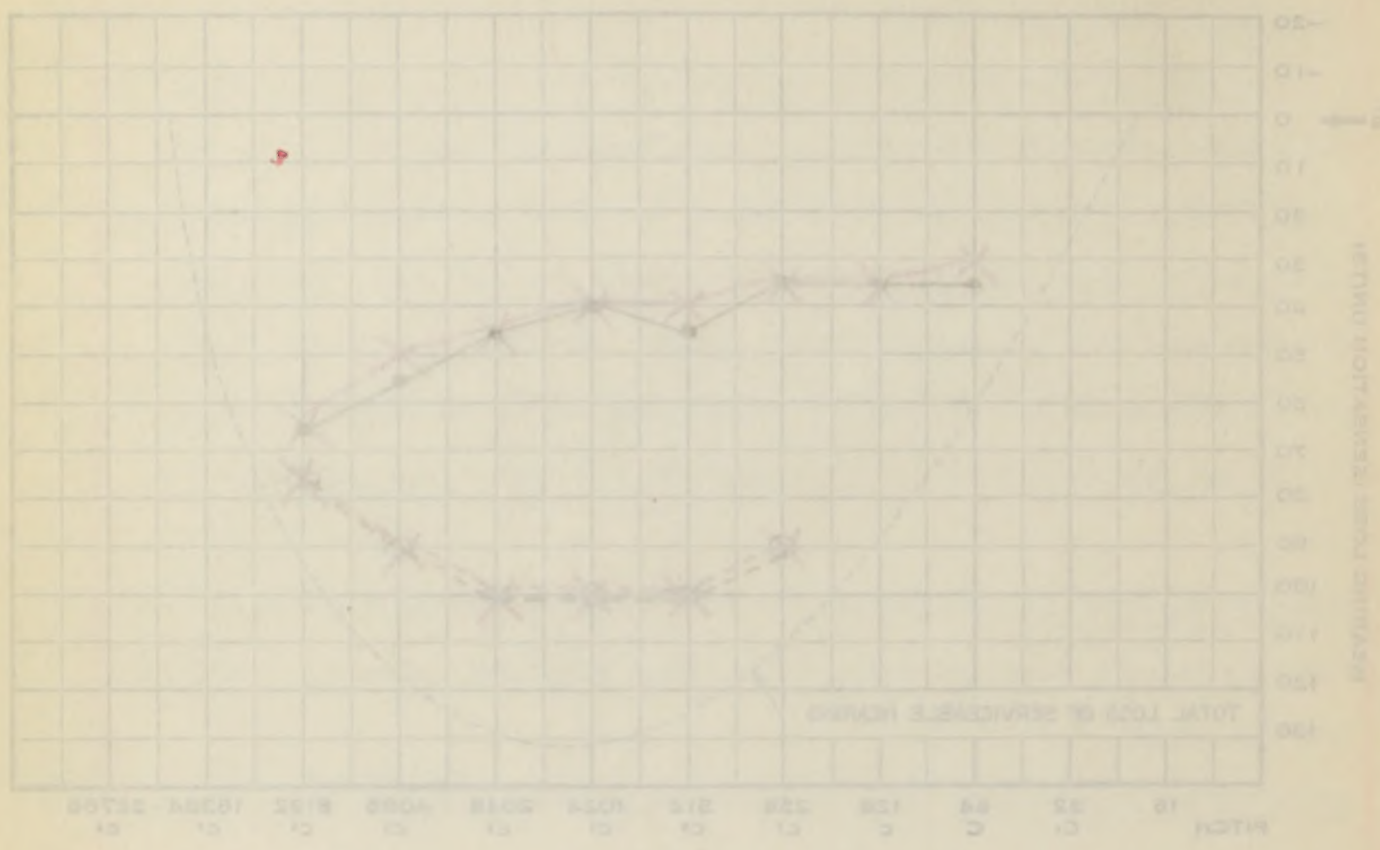
Whisper

Voice

EVANS MEMORIAL

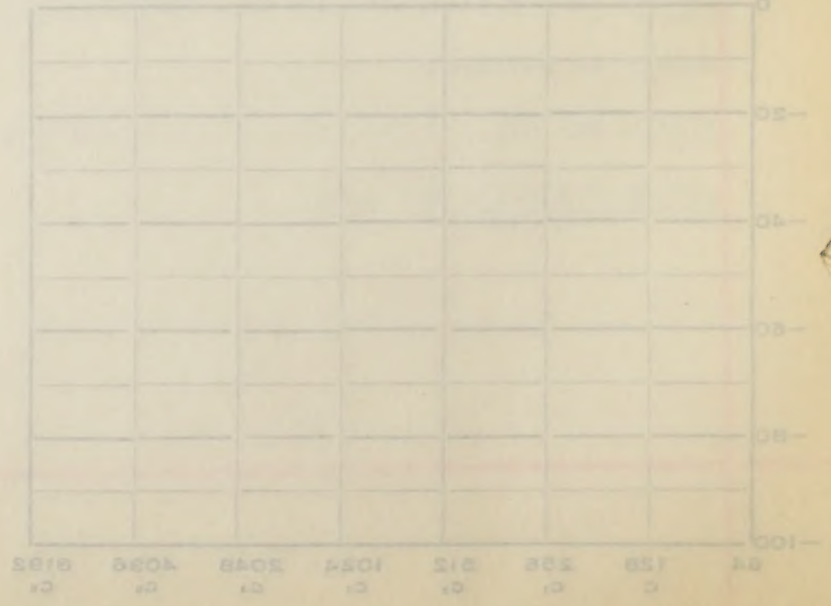
NAME R.D. 798310
DATE 12 19

AUDIOGRAM



Percentage Hearing Loss
Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Webster - 4 points
(2-point test difficult)
Diagnosis
Duration
Chief Complaint
1. Location
2. Pain
3. Discharge
4. Tinnitus
5. Itching
6. Other
Left
Right
AC
BC
R
W
U
L
W
V

A... D...; #745,310; Female; Age 52; White; Widow.

DIAGNOSIS: Multiple sclerosis.

The history on this patient is rather vague. However, it appears that she fell down several flights of stairs, which was followed by a period of unconsciousness. The fall was associated with premonitory dizziness and nausea. Patient says that she has been troubled with dizziness for the past two or three months, the attacks occurring about once a week and often accompanied with unconsciousness. Vomiting has been present but is not a regular occurrence. For about the past year there has been gradually increasing weakness of the legs, with walking becoming ever more difficult.

PHYSICAL EXAMINATION: The patient is moderately obese and shows rather heavy growth of hair over the chin. She looks rather older than her chronological age. The oral hygiene is poor with caries and pyorrhea. There are numerous contusions over the right forearm, the left lower leg, the dorsum pedis of the right hip and the lower lumbar region.

NEUROLOGICAL EXAMINATION: The patient seems well oriented but mentality seems rather low. The pupils react only sluggishly to light but better to accommodation, while the discs appear gray and definitely atrophied. Nystagmus is present. The tongue deviates to the right on extension, while the left side of the face moves better than the right and the gag reflex is absent. The lower extremities are weak, with a loss of position and vibratory senses. There are bilateral, positive Babinski, Chaddock and Oppenheim.

URINE: Cloudy Amber; alkaline; sp. gr. 1026; no sugar nor albumen.

BLOOD: 78% Hgb.; 4,800,000 RBC.; 8,400 WBC.; NPN 40; BS 91; Kahn negative.

LUMBAR PUNCTURE: I.P. 90; dynamics normal; 15 cc. removed; F.P. 40; appearance normal; 7 W.B.C.; 0 R.B.C.; positive Ross-Jones and Pandy; protein 32 mg/100 cc.; gold sol 5554321000; Wasserman negative.

A... D...; 5'4", 110; Female; Age 32; White; Widow.

DIAGNOSIS: Multiple sclerosis.

The history on this patient is rather vague. However, it appears that she fell down several nights of sleep, which was followed by a period of unconsciousness. The fall was associated with presyncopal distress and nausea. Patient says that she has been troubled with dizziness for the past two or three months, the attacks occurring about once a week and often associated with unconsciousness. Vomiting has been present but is not a regular occurrence. For about the past year there has been gradually increasing weakness of the legs, with walking becoming ever more difficult.

PHYSICAL EXAMINATION: The patient is moderately obese and shows rather heavy growth of hair over the chin. She looks rather older than her chronological age. The oral hygiene is poor with caries and pyorrhea. There are numerous contusions over the right forearm, the left lower leg, the dorsal pedis of the right hip and the lower lumbar region.

NEUROLOGICAL EXAMINATION: The patient seems well oriented but mentally seems rather low. The pupils react only sluggishly to light but better to accommodation, while the discs appear gray and definitely atrophied. Nystagmus is present. The tongue deviates to the right on extension, while the left side of the face moves better than the right and the gag reflex is absent. The lower extremities are weak, with a loss of position and vibratory sense.

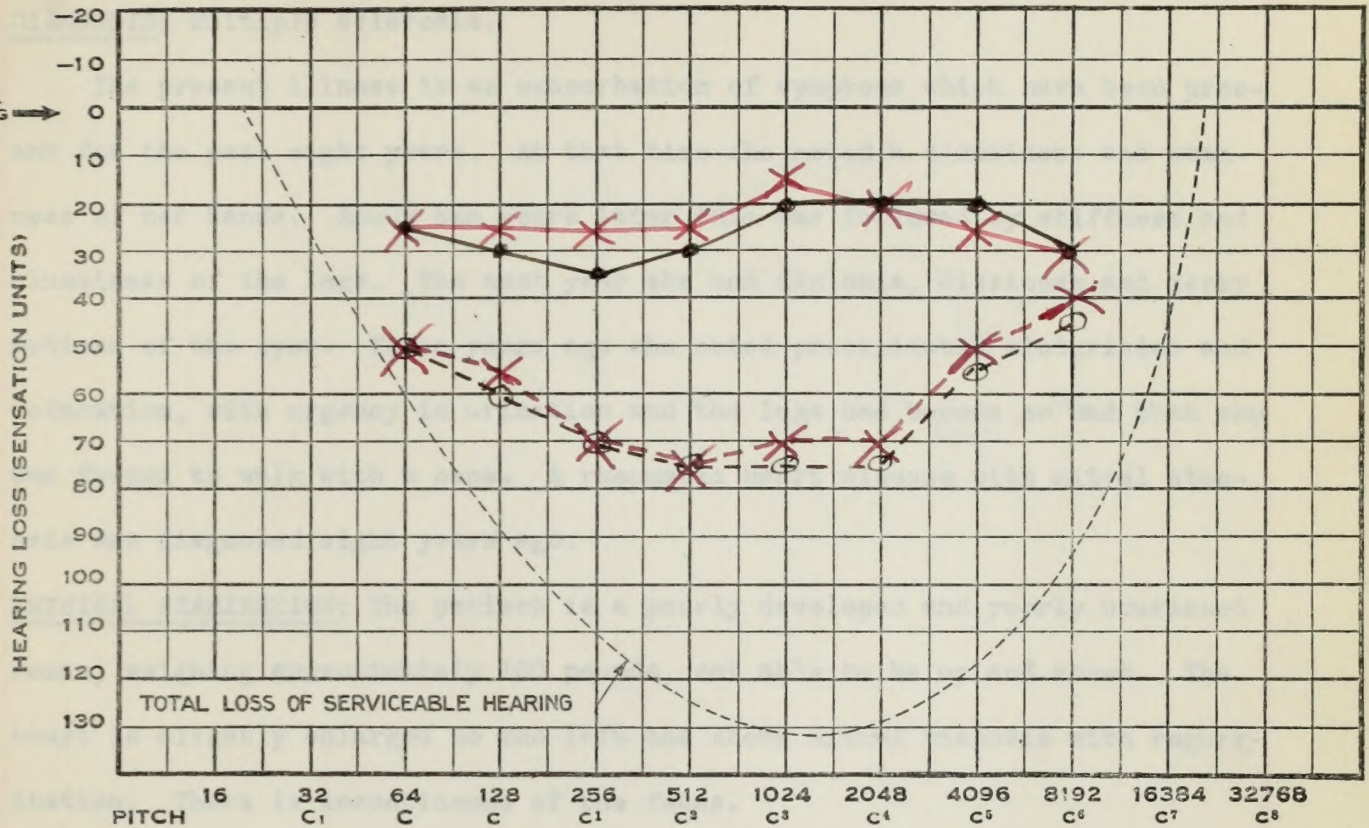
There are bilateral, positive Babinski, Chaddock and Oppenheim.

URINE: Cloudy amber; alkaline; sp. gr. 1.025; no sugar nor albumen.

BLOOD: Hgb.: 4,800,000 RBC.; 8,400 WBC.; 12,500 PLT.; ESR: 40; Kahn negative.

LUMBAR PUNCTURE: I.P. 90; dynamics normal; 15 cc. removed; E.P. 40; appearance normal; V.B.C.: 0; E.B.C.: positive Ross-Jones and Landy; protein

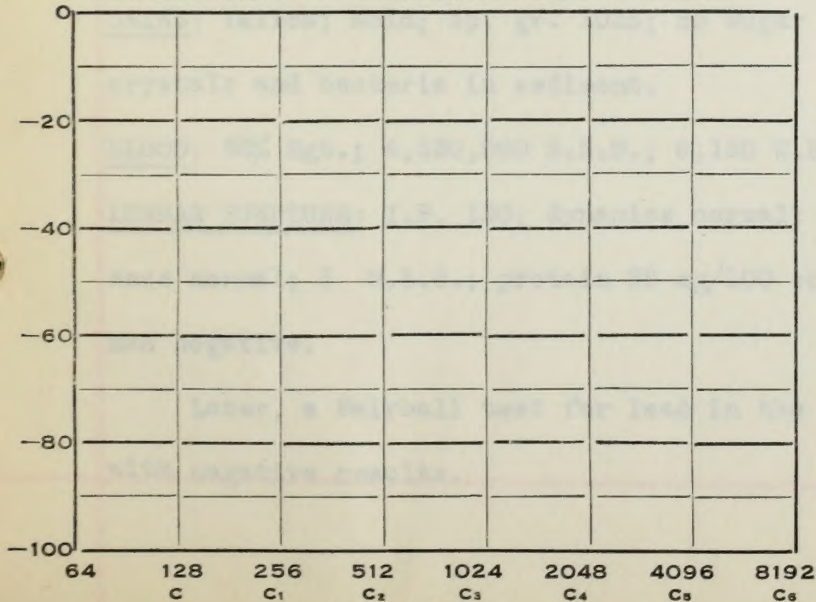
12 cc. removed; ESR: 40; Kahn negative.

EVANS MEMORIAL**AUDIOGRAM**NAME K. M. 725 887
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSSWeber Right { Vertex
Forehead
Nose bridge
Chin

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

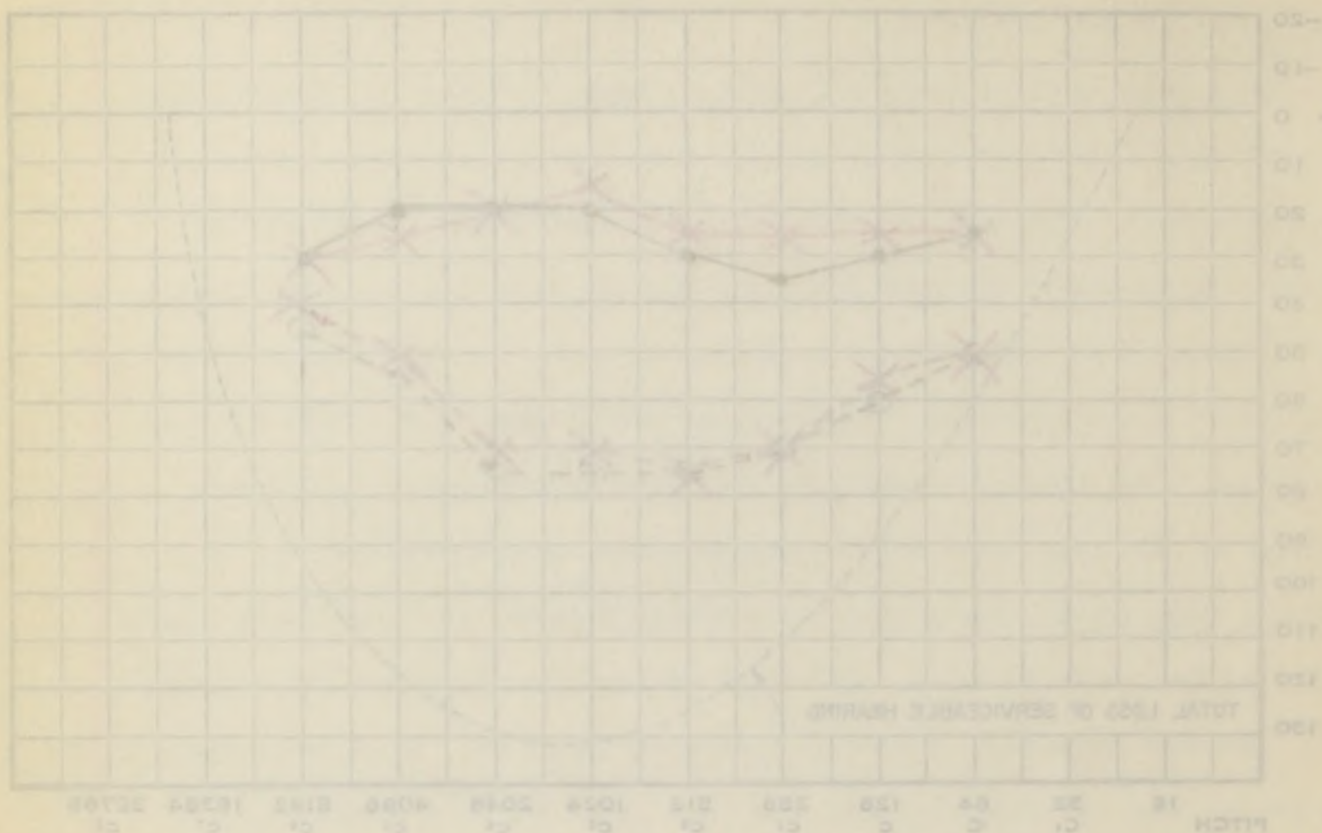
AUDIOGRAM

NAME

K.M.

DATE

19

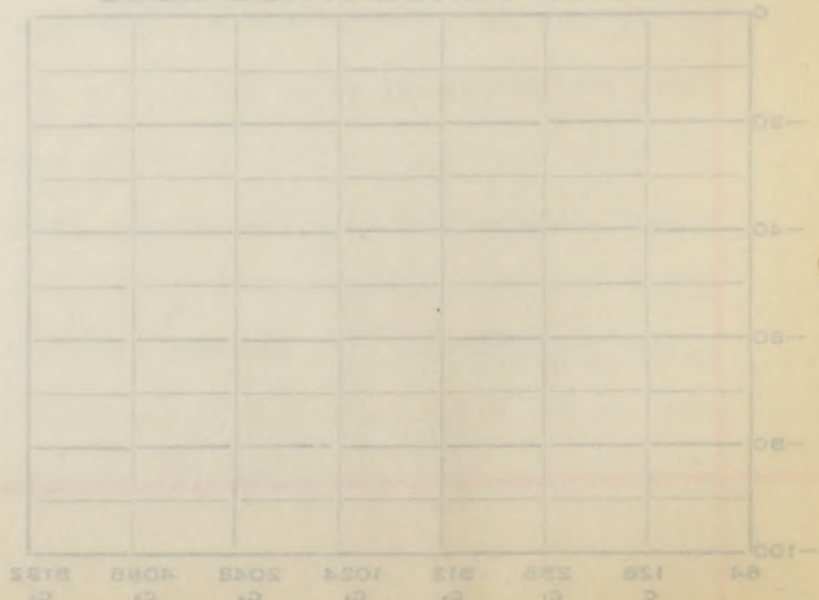


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Diagnosis

Duration

Chief Complaint

1. Tinnitus

2. Pain

3. Discharge

4. Itching

5. Headache

6. Dizziness

Right

Left

Right

Left

Upper Limit

Lower Limit

Weight

Volume

Wetter Right (Faint)
= 100%
= 100%

K... M...; #725,887; Female; Age 34; White; Single.

DIAGNOSIS: Multiple sclerosis.

The present illness is an exacerbation of symptoms which have been present for the past eight years. At that time she noted a clumsiness and weakness of her hands. About two years later this was followed by stiffness and clumsiness of the legs. The next year she had diplopia, dizziness and jerky motions of the eyes. Three years ago she noted precipitated micturition and defecation, with urgency in urination and the legs had become so bad that she was forced to walk with a cane. A rheumatic heart disease with mitral stenosis was diagnosed eight years ago.

PHYSICAL EXAMINATION: The patient is a poorly developed and poorly nourished woman, weighing approximately 100 pounds, not able to be up and about. The heart is slightly enlarged to the left and shows mitral stenosis with regurgitation. There is incontinence of the feces.

NEUROLOGICAL EXAMINATION: The mood is euphoric. The patient speaks with a slurred speech and has a marked intention tremor of the hands. The abdominal reflexes are lost, the legs are spastic, with anesthesia to pain in the left leg and foot. The deep reflexes are hyperactive, with bilateral Babinski, Chaddock and Oppenheim.

URINE: Yellow; acid; sp. gr. 1025; no sugar nor albumen; 30 W.B.C.; numerous crystals and bacteria in sediment.

BLOOD: 80% Hgb.; 4,530,000 R.B.C.; 8,150 W.B.C.; Kahn negative; pr. 110/80.

LUMBAR PUNCTURE: I.P. 130; dynamics normal; 20 cc. removed; F.P. 0; appearance normal; 1 W.B.C.; protein 28 mg/100 cc.; gold sol 0123210000; Wasserman negative.

Later, a Fairball test for lead in the cerebro-spinal fluid was done with negative results.

M... M...; 4735, 887; Female; Age 54; White; Single.

DIAGNOSIS: Multiple sclerosis.

The present illness is an exacerbation of symptoms which have been present for the past eight years. At that time she noted a clumsiness and weakness of her hands. About two years later this was followed by stiffness and clumsiness of the legs. The next year she had diplopia, dizziness and jerky motions of the eyes. Three years ago she noted precipitated micturition and retention, with urgency in urination and the legs had become so bad that she was forced to walk with a cane. A rheumatic heart disease with mitral stenosis was diagnosed eight years ago.

PHYSICAL EXAMINATION: The patient is a poorly developed and poorly nourished woman, weighing approximately 100 pounds, not able to be up and about. The heart is slightly enlarged to the left and shows mitral stenosis with regurgitation. There is incontinence of the feces.

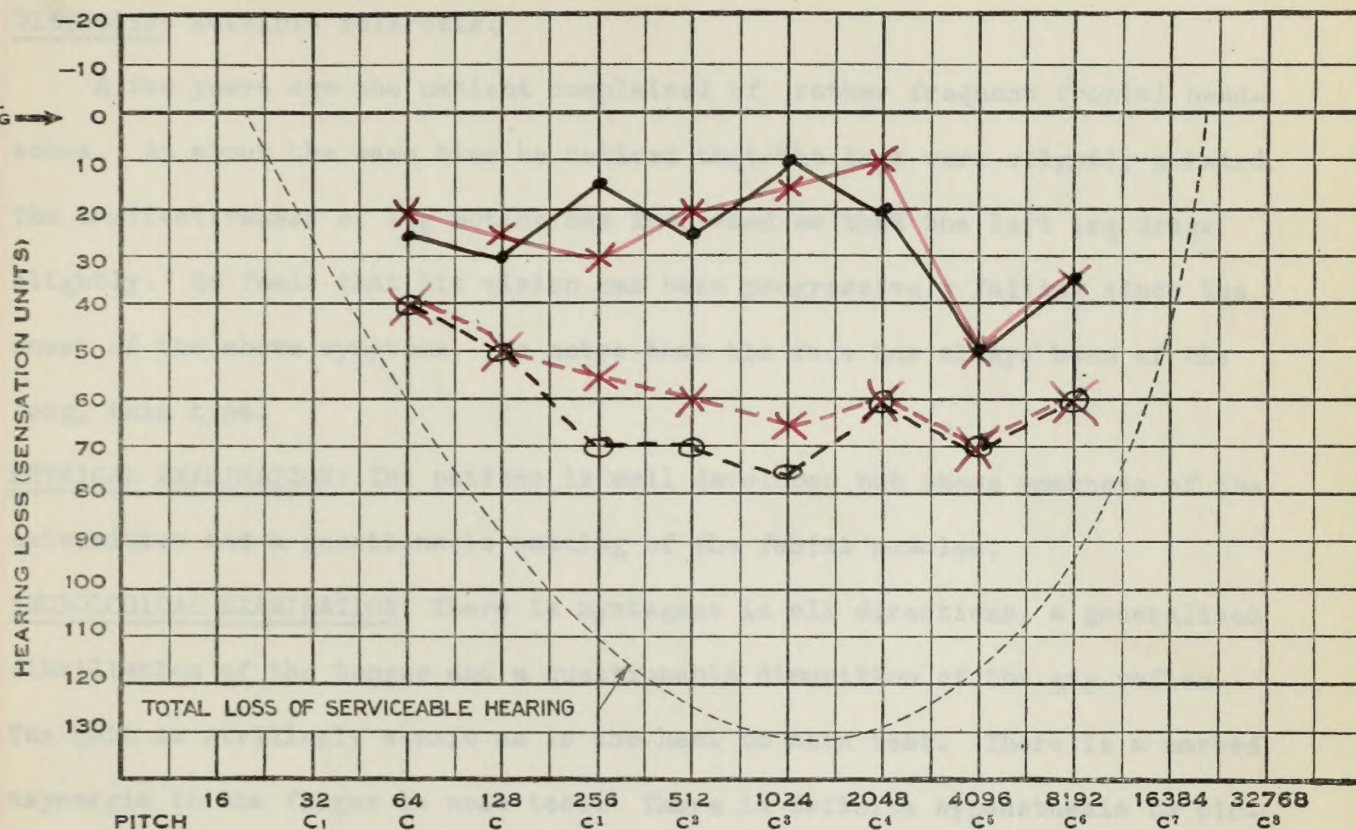
NEUROLOGICAL EXAMINATION: The mood is euphoric. The patient speaks with a slurred speech and has a marked intention tremor of the hands. The abdominal reflexes are lost, the legs are spastic, with anesthesia to pain in the left leg and foot. The deep reflexes are hyperactive, with bilateral Babinski, Chaddock and Oppenheim.

URINE: Yellow; acid; sp. gr. 1.028; no sugar nor albumen; 30 W.B.C.; numerous crystals and bacteria in sediment.

BLOOD: Hgb.: 4,250,000 R.B.C.: 8,150 W.B.C.: 11,000; Keim negative; pr. 110/80.
LUNAR PORTION: I.P. 130; dynamics normal; 20 cc. removed; F.P. 0; appear-
ance normal; 1 W.B.C.; protein 28 mg/100 cc.; gold sol 012210000; Wasser-
man negative.

Later, a Lippman test for lead in the cerebro-spinal fluid was done

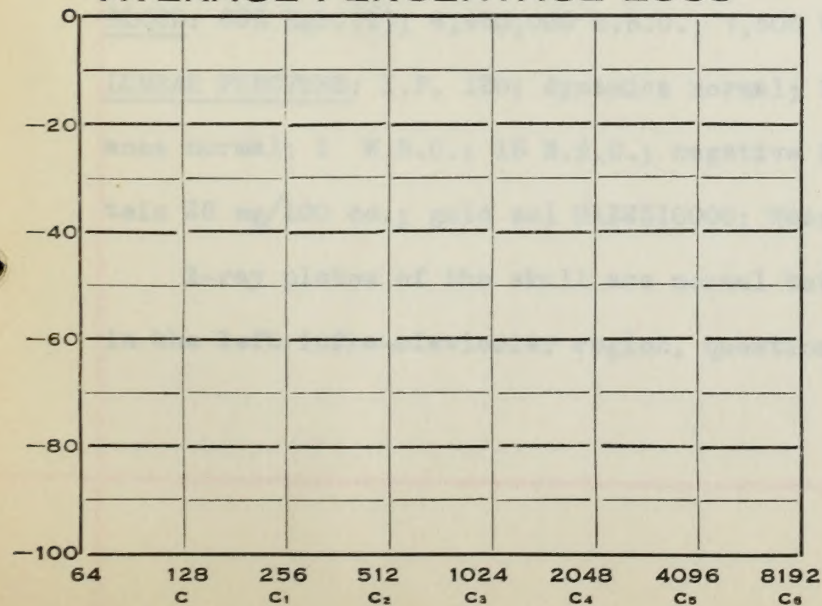
with negative results.

EVANS MEMORIAL**AUDIOGRAM**NAME E.F.W. 717582
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

EVANS MEMORIAL

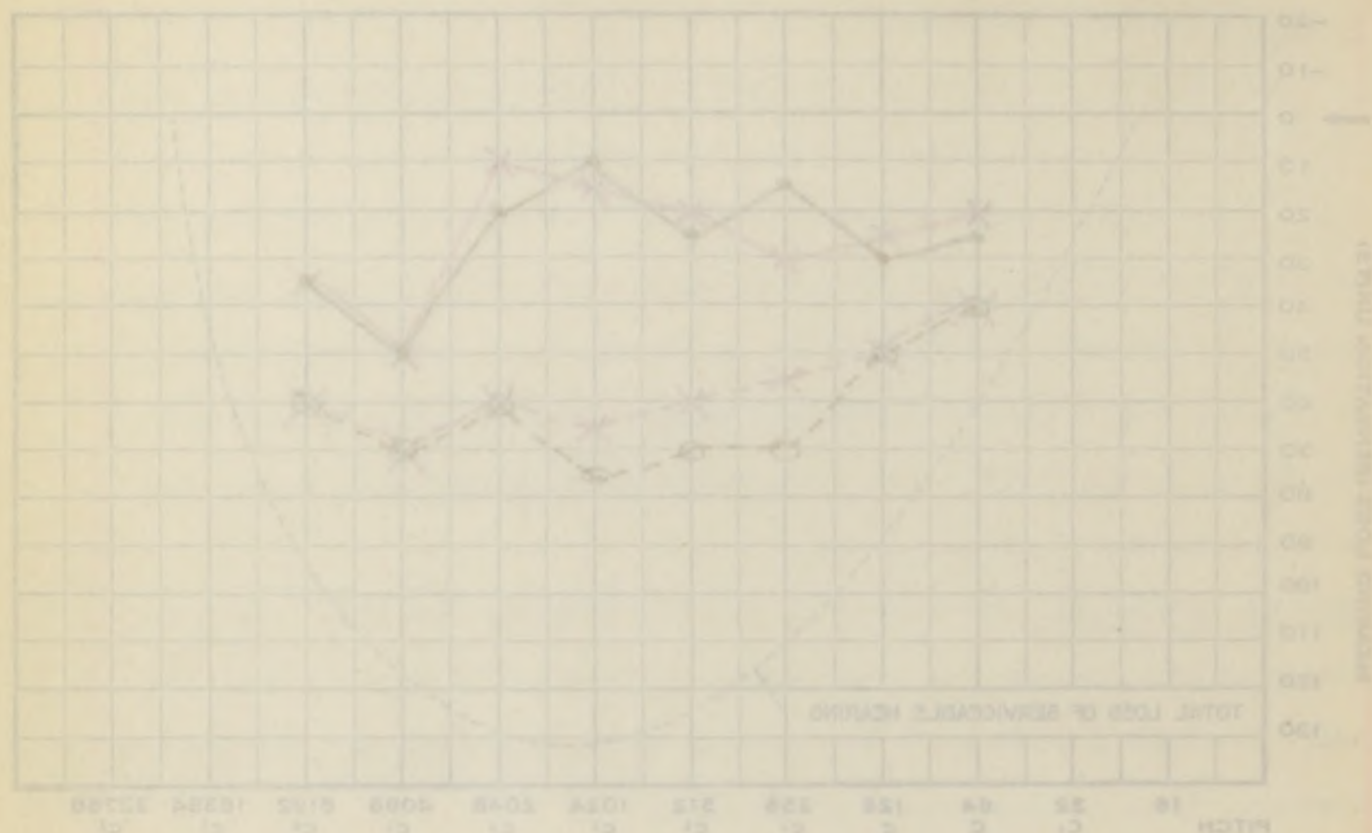
717482

E.F.W.

NAME

DATE

AUDIOGRAM

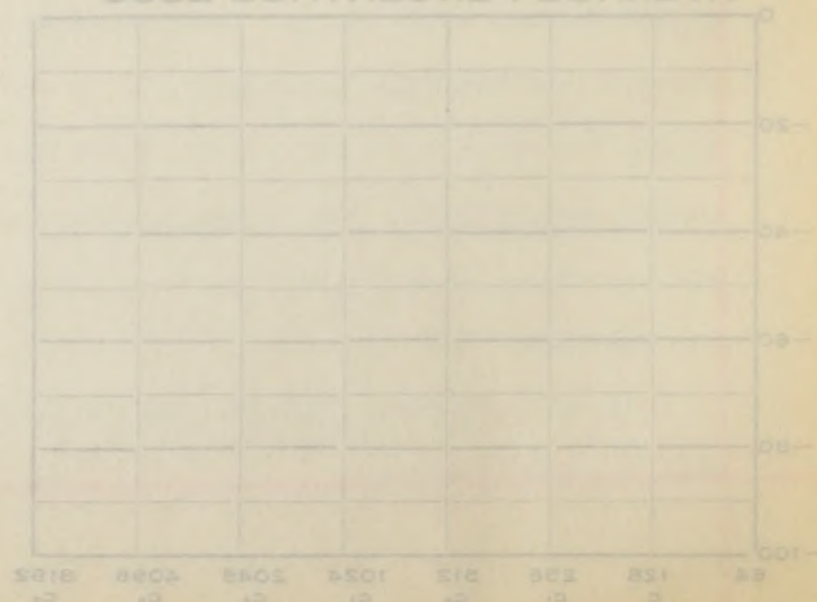


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Duration

Duration

Chief Complaint

1. History

2. Physical

3. Laboratory

4. Treatment

5. Results

6. Discussion

Left

Right

Time

When

Upper Limit

Lower Limit

Weight

Volume

E... W...; #717,582; Male; Age 24; White; Single.

DIAGNOSIS: Multiple sclerosis.

A few years ago the patient complained of rather frequent frontal headaches. At about the same time he noticed that the legs were slightly awkward. The ineffectiveness of leg motion has increased so that the left leg drags slightly. He feels that his vision has been progressively failing since the onset of the above symptoms. He notes that his face has always been of the long, thin type.

PHYSICAL EXAMINATION: The patient is well developed but shows weakness of the extremities and a questionable wasting of the facial muscles.

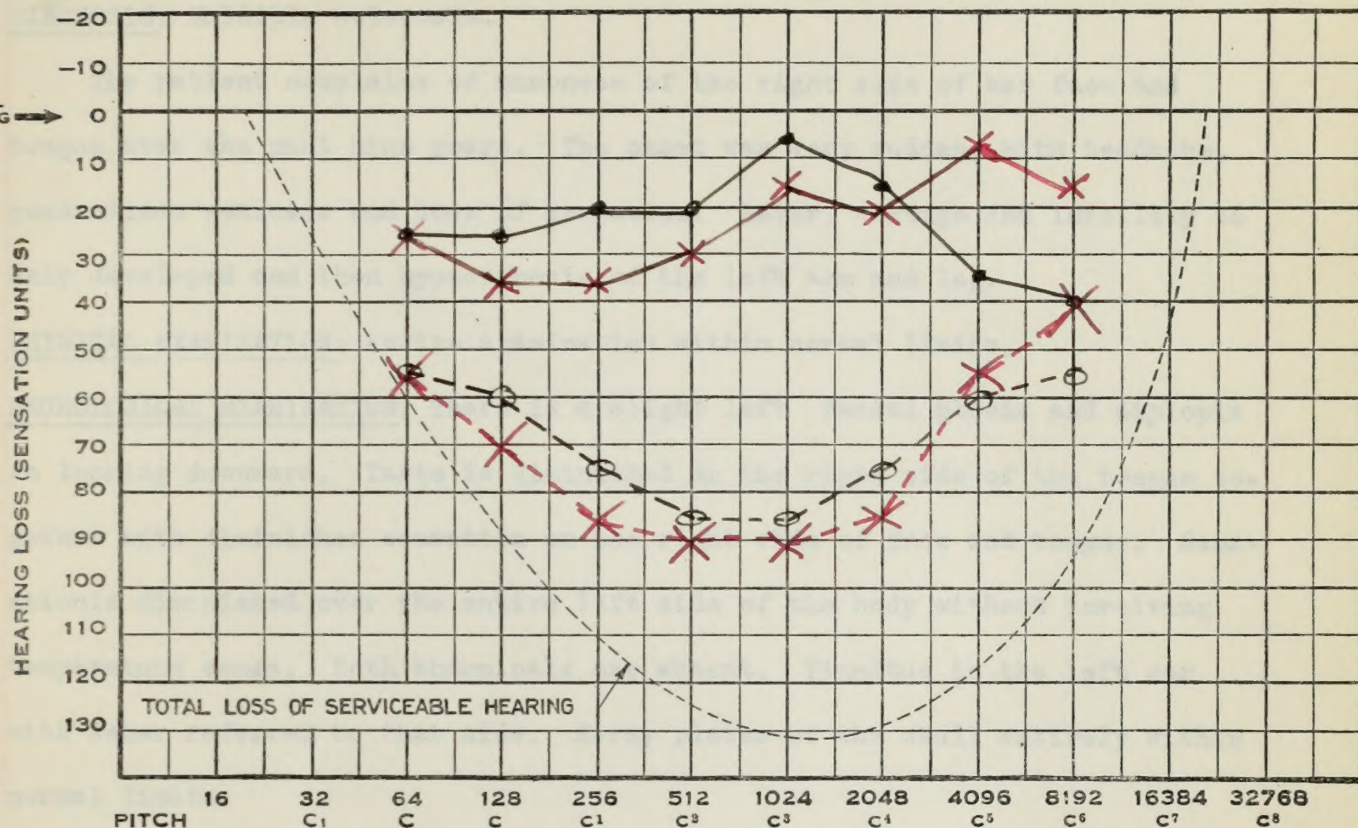
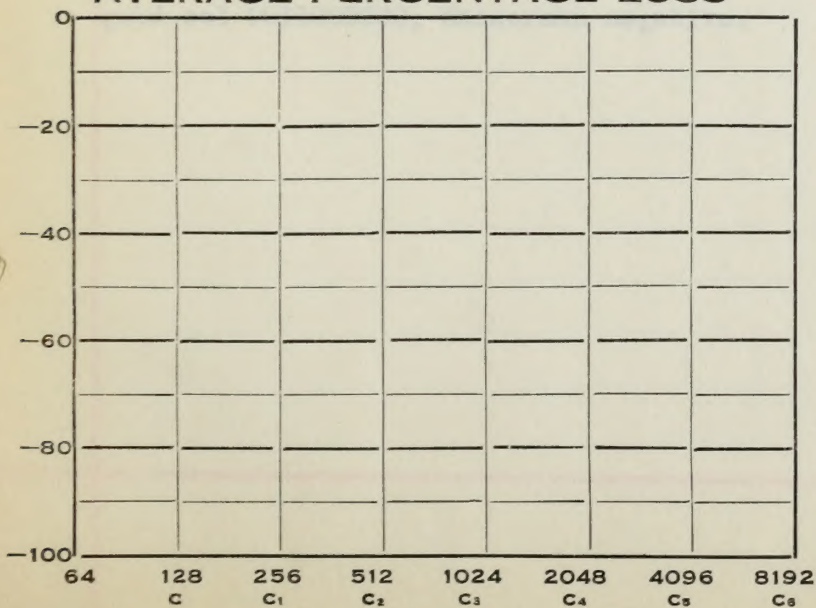
NEUROLOGICAL EXAMINATION: There is nystagmus in all directions, a generalized fibrillation of the tongue and a questionable diminution of the gag reflex. The gait is strikingly ataxic as is the heel to shin test. There is a marked asynergia in the finger to nose test. There is definite hypaesthesia to pinprick over the regions D 10 to L 1 and diminished vibration sense from L 3 down. The Romberg is strongly positive. The triceps, wrist and abdominal reflexes are absent, while there is bilateral Babinski, Chaddock, ankle and patellar clonus. The skin stroke and pilomotor reactions show hyperactivity.

URINE: Amber; acid; sp. gr. 1020; no sugar nor albumen.

BLOOD: 85% Hgb.(T); 4,450,000 R.B.C.; 7,500 W.B.C.; Kahn negative; pr.110/74.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 25 cc. removed; F.P. 30; appearance normal; 1 W.B.C.; 15 R.B.C.; negative Ross-Jones; positive Pandy; protein 28 mg/100 cc.; gold sol 0122310000; Wasserman negative.

X-ray plates of the skull are normal but the chest shows infiltration in the left infra-clavicular region, questionable tuberculosis.

EVANS MEMORIAL**AUDIOGRAM**NAME A.F. 693594
DATE 19*Weber Left at 4 Points.***AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

RightLeftRinne ^{AC}
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

A... F...; #693,594; Female; Age 33; White; Single.

DIAGNOSIS: Multiple sclerosis.

The patient complains of numbness of the right side of her face and tongue over the past nine years. The onset was very sudden, with headache, generalized weakness and loss of sensation. Later, vertigo and inability to walk developed and then hypaesthesia of the left arm and leg.

PHYSICAL EXAMINATION: Entire examination within normal limits.

NEUROLOGICAL EXAMINATION: There is a slight left facial ptosis and diplopia on looking downward. Taste is diminished on the right side of the tongue together with diminished sensation on the right side of face and tongue. Sensation is diminished over the entire left side of the body without involving temperature sense. Both abdominals are absent. Tinnitus in the left ear with Weber referred to that side. X-ray plates of the skull entirely within normal limits.

URINE: Yellow; acid; sp. gr. 1025; no sugar nor albumen; epithelial cells in sediment.

BLOOD: 75% Hgb. (T); 8,400 W.B.C.; Kahn negative; pressure 92/60.

LUMBAR PUNCTURE: I.P. 90; dynamics normal; 8 cc. removed; F.P. 50; appearance normal; 0 W.B.C.; 10 R.B.C.; negative Ross-Jones and Pandy; pro. 37 mg/100 cc.; gold sol 0011000000; Wasserman negative.

... F...; 4022, 504; Female; Age 50; White; Single.

DIAGNOSIS: Multiple sclerosis.

The patient complains of numbness of the right side of her face and tongue over the past nine years. This onset was very sudden, with headache, generalized weakness and loss of sensation. Later, vertigo and inability to walk developed and then hypoaesthesia of the left arm and leg.

PHYSICAL EXAMINATION: Entire examination within normal limits.

NEUROLOGICAL EXAMINATION: There is a slight left facial palsy and diplopia on looking downwards. Taste is diminished on the right side of the tongue together with diminished sensation on the right side of face and tongue. Sensation is diminished over the entire left side of the body without involving temperature sense. Both abdominal are absent. Flaccid in the left arm with Weber referred to that side. X-ray plates of the skull entirely within normal limits.

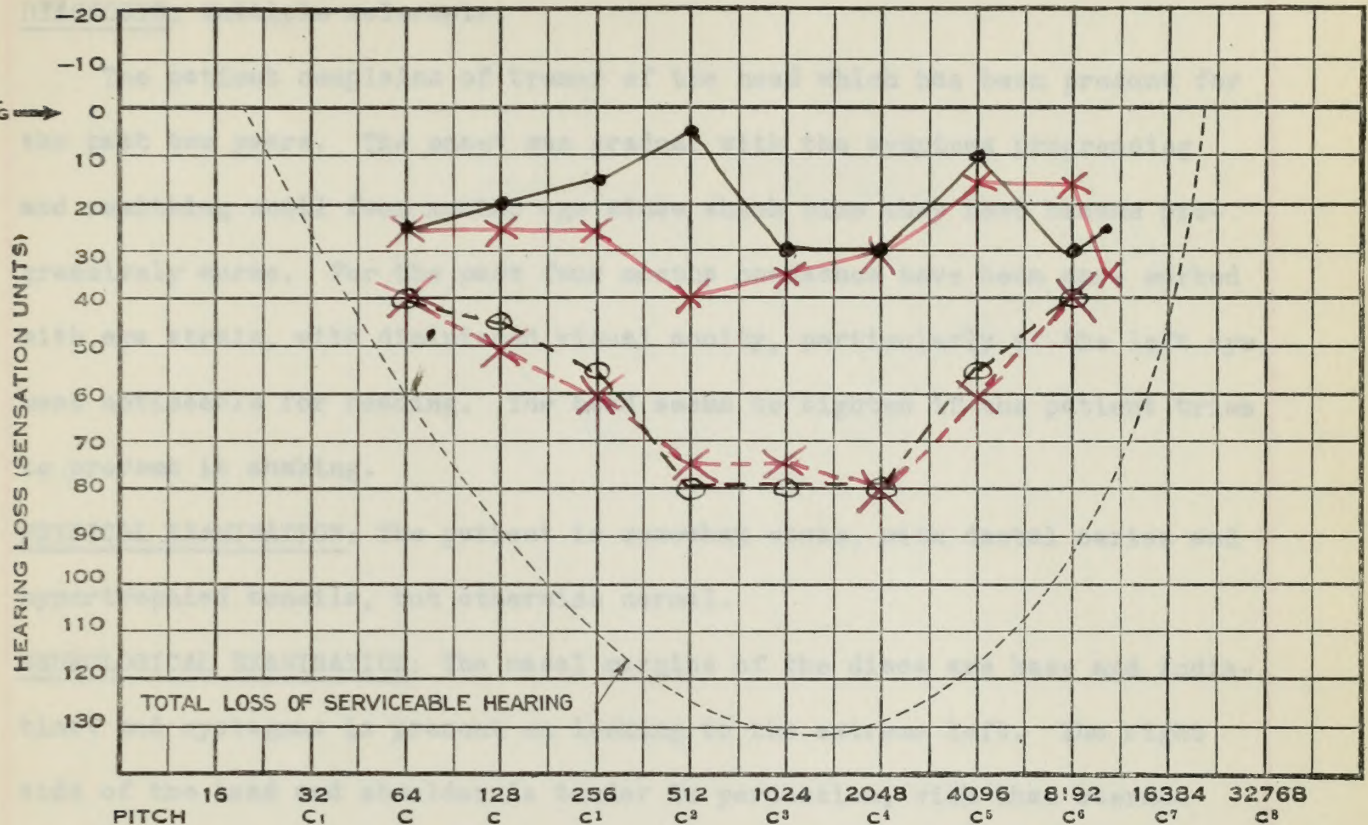
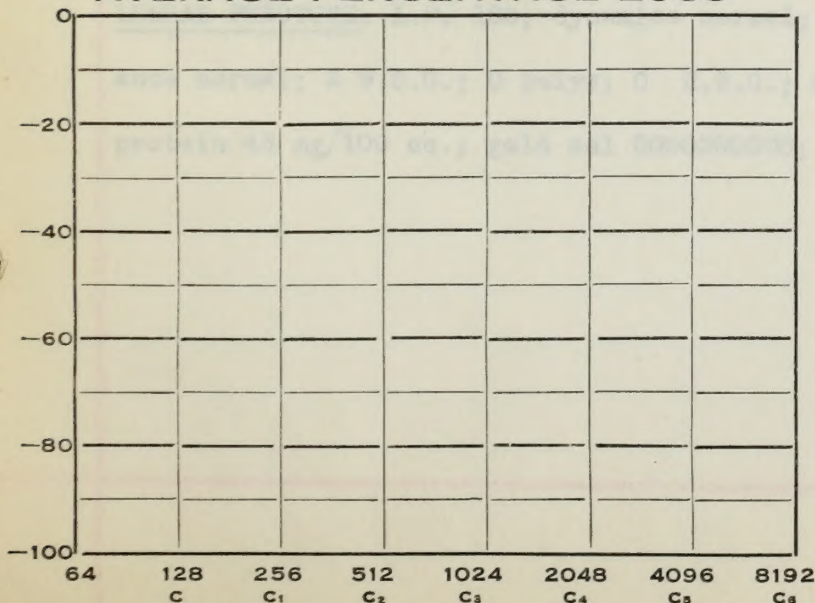
HAIR: Yellow; soft; no. 1025; no sugar nor albumen; epidermal cells in sediment.

BLOOD: VSG Hgt. (T); 8.400 W.B.C.; Kahn negative; pressure 82/60.

URINARY FUNCTION: I.F. 50; dynamics normal; 8 cc. removed; 2.4. 50; appearance

normal; 0 W.B.C.; 10 R.R.C.; negative Ross-Jones and Pandey; pro. 2V mg/100 cc.

Gold sol 001000000; Wassermann negative.

EVANS MEMORIAL**AUDIOGRAM**NAME M. D. 700511
DATE..... 19.....**AVERAGE PERCENTAGE LOSS**

Weber = Vertex

Right { Forehead
Nose bridge
Chin

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right

Left

Rinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

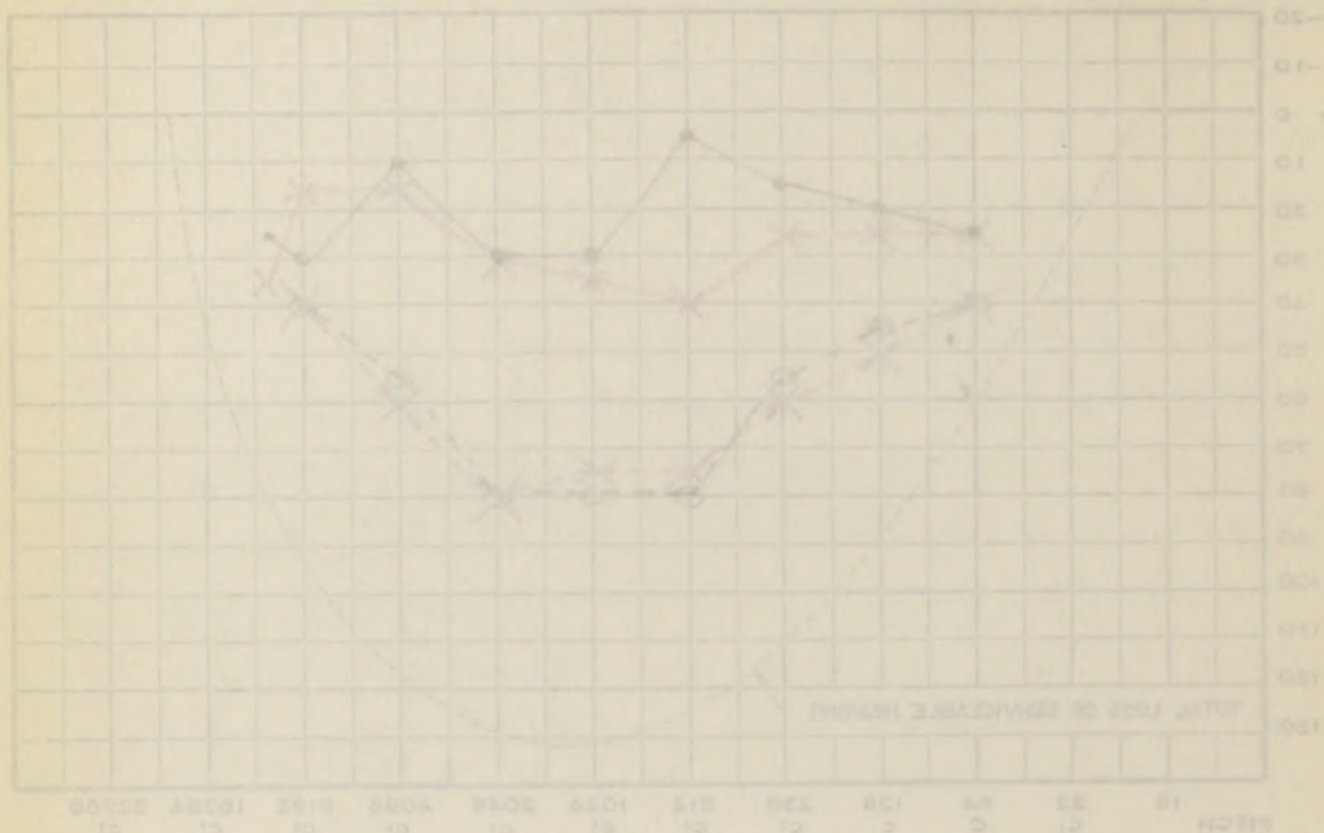
AUDIOGRAM

700211

M.D.

NAME

DATE

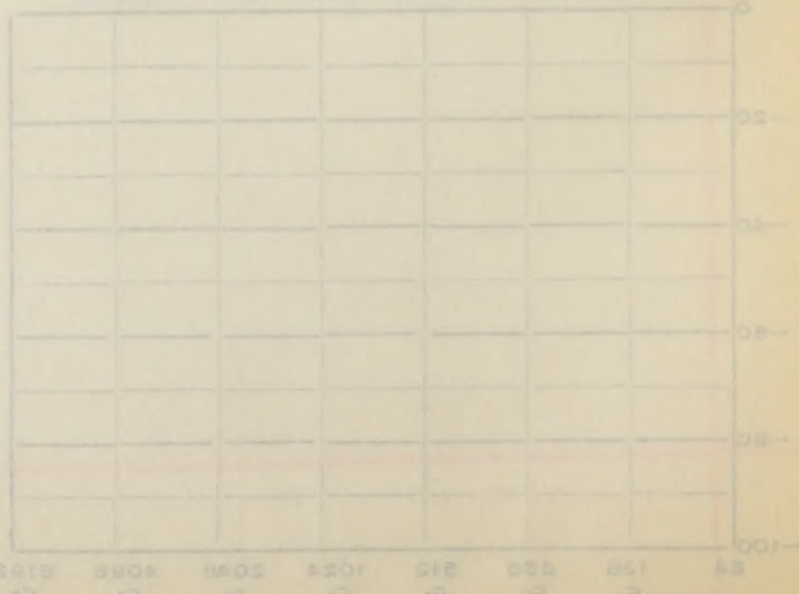


Refractive Error

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Diagnosis

Diagnosis

Chief Complaint

1. History

2. Physical

3. Laboratory

4. Treatment

5. Prognosis

6. Discussion

Right

Left

Notes

Upper Limit

Lower Limit

Upper

Lower

Notes

Webster - Verter

Right / Neck Bridge

Chin

M...D...; #700,511; Female; Age 39; White; Married.

DIAGNOSIS: Multiple sclerosis.

The patient complains of tremor of the head which has been present for the past two years. The onset was gradual with the symptoms progressing and remitting until four months ago since which time they have become progressively worse. For the past four months headaches have been more marked with eye strain, with diminished visual acuity, particularly of the left eye, most noticeable for reading. The head seems to tighten if the patient tries to prevent it shaking.

PHYSICAL EXAMINATION: The patient is somewhat obese, with dental caries and hypertrophied tonsils, but otherwise normal.

NEUROLOGICAL EXAMINATION: The nasal margins of the discs are hazy and indistinct and nystagmus is present on looking to the extreme left. The right side of the head and shoulder is tender to percussion, with that sternomastoid muscle more tense than the left. The head tends to tilt toward the right. There is a fine tremor of the head, neck, arms and hands.

URINE: Amber; neutral; sp. gr. 1020; no sugar nor albumen.

BLOOD: 90% Hgb.; 5,200,000 R.B.C.; 6,000 W.B.C.; Kahn negative; B.S. 112; pressure 120/80.

LUMBAR PUNCTURE: I.P. 180; dynamics normal; 10 cc. removed; F.P. 90; appearance normal; 2 W.B.C.; 0 polys; 0 R.B.C.; negative Ross-Jones and Pandy; protein 43 mg/100 cc.; gold sol 0000000000; Wasserman negative.

M...D...: 3700, 511; Female; Age 38; White; Married.

DIAGNOSIS: Multiple sclerosis.

The patient complains of tremor of the hand which has been present for the past two years. The onset was gradual with the symptoms progressing and receding until four months ago since which time they have become progressively worse. For the past four months headaches have been more marked with eye strain, with diminished visual acuity, particularly of the left eye, most noticeable for reading. The hand seems to tighten if the patient tries to prevent it shaking.

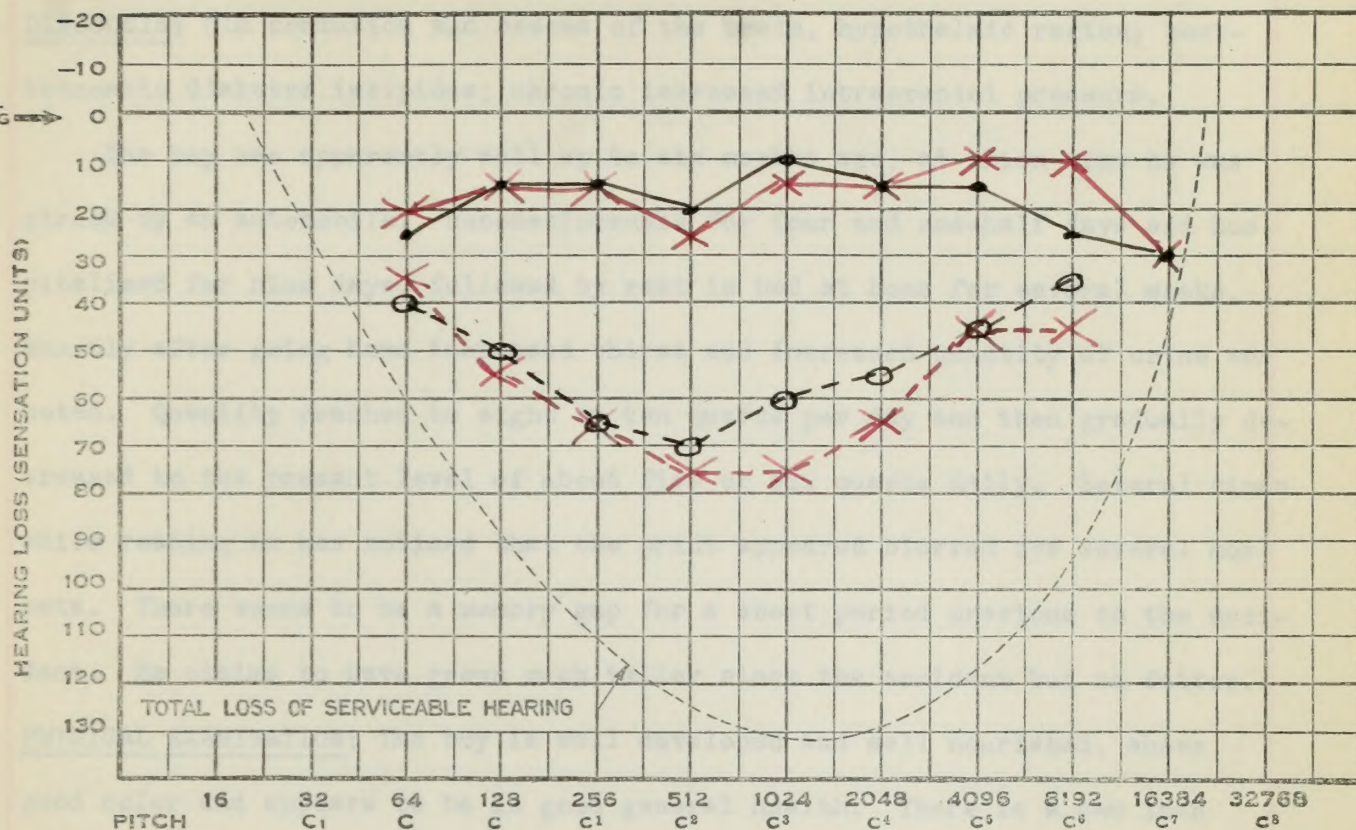
PHYSICAL EXAMINATION: The patient is somewhat obese, with dental caries and hyperthroid features, but otherwise normal.

NEUROLOGICAL EXAMINATION: The nasal margins of the discs are hazy and indistinct and nystagmus is present on looking to the extreme left. The right side of the head and shoulder is tender to percussion, with that sternomastoid muscle more tender than the left. The head tends to tilt toward the right. There is a fine tremor of the head, neck, arms and hands.

URINE: Amber; neutral; sp. gr. 1.020; no sugar nor albumen.

BLOOD: 50% Hb.; 5,200,000 R.B.C.; 5,000 W.B.C.; E.S. negative; S.E. 112; pressure 120/80.

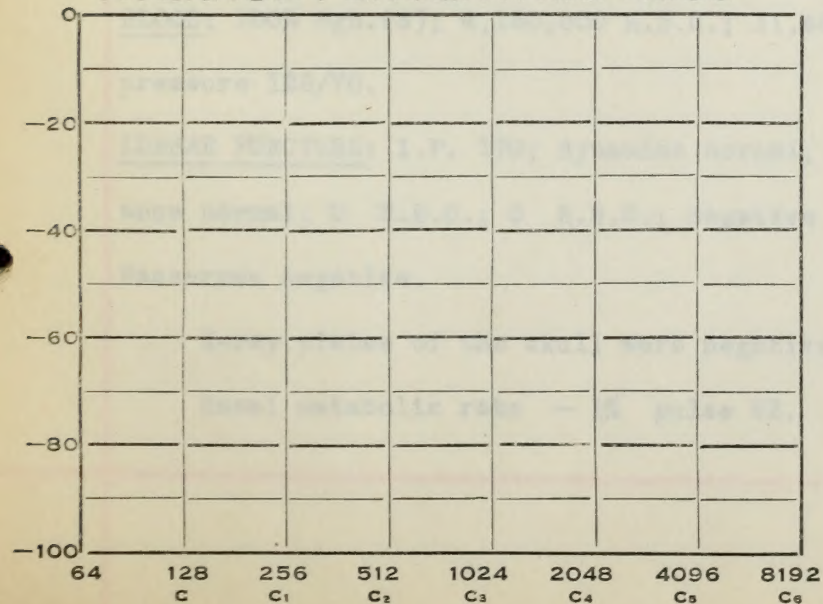
LUMBAR PUNCTURE: I.P. 180; dynamics normal; 10 cc. removed; P.P. 90; appearance normal; S.W.B.C.; 0 polys; 0 R.B.C.; negative Ross-Jones and Pandey; protein 45 mg/100 cc.; gold sol 0000000000; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**NAME A.P. 702 071
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne $\frac{AC}{BC}$

Weber

Upper Limit

Lower Limit

Whisper

Voice

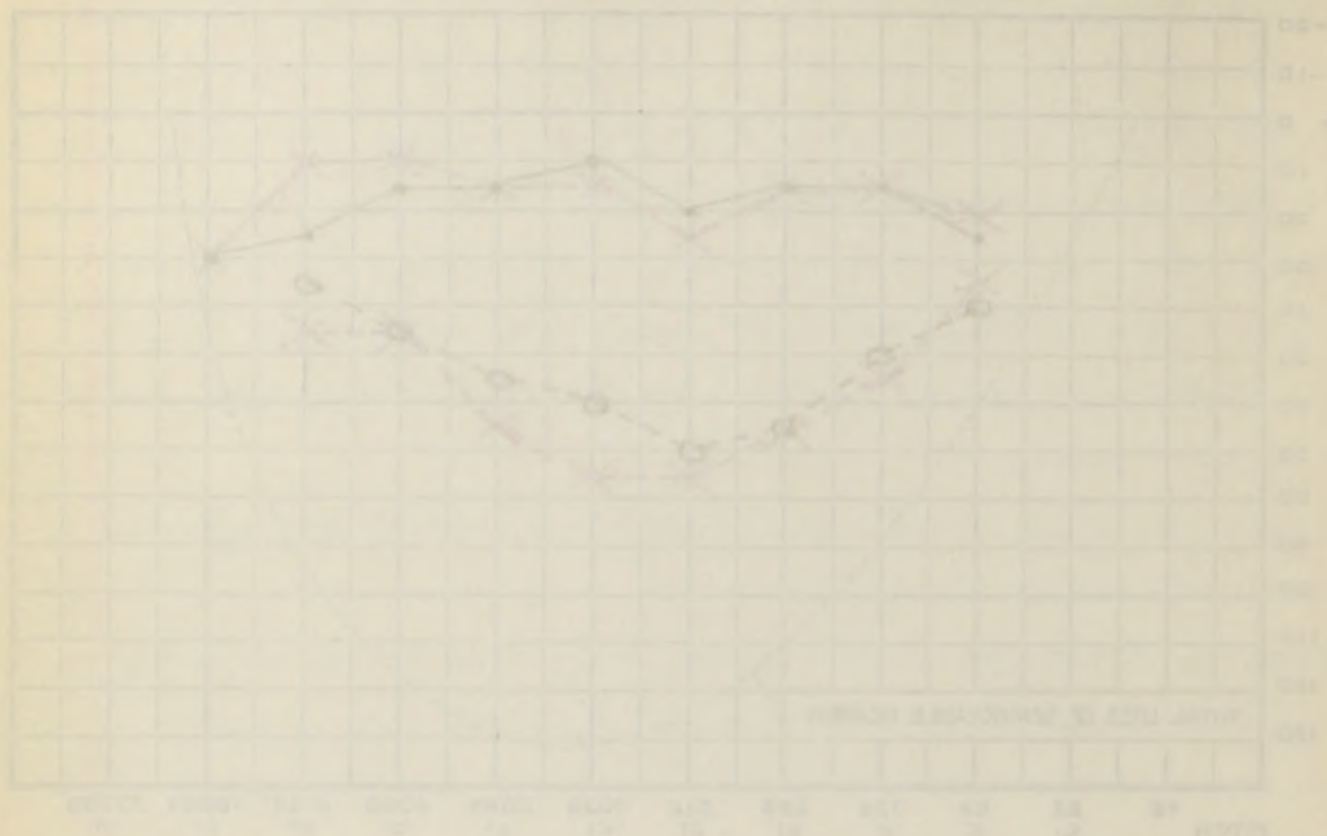
EVA'S MEMORIAL

AUDIOGRAM

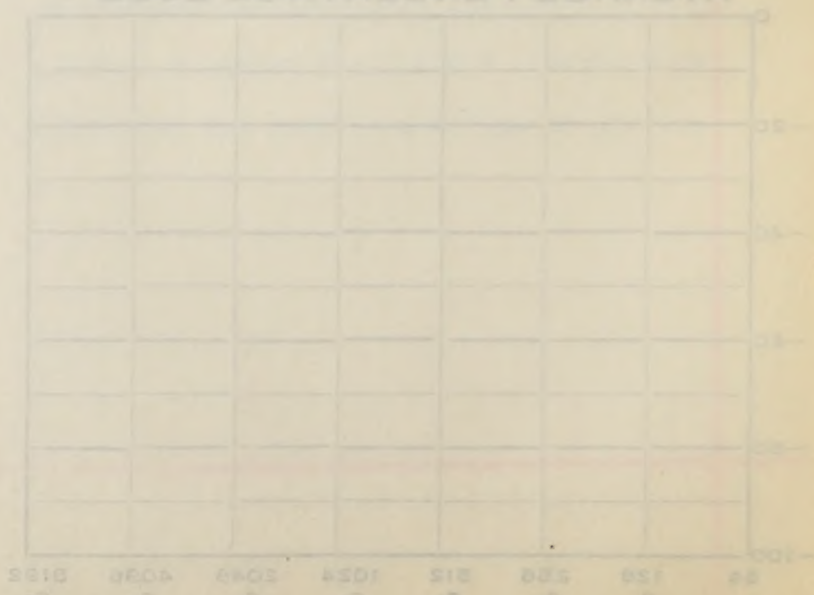
NAME
DATE

R.P.

705 071



AVERAGE PERCENTAGE LOSS



Diagnosis
Chief Complaint

1. Hearing
2. Tinnitus
3. Vertigo
4. Deafness
5. Headache
6. Dizziness

Signs

Tests

History
Present Illness
Past History
Family History
Social History
Review of Systems

A... E... P...; #702,071; Male; Age 15; White; Single.

DIAGNOSIS: Old contusion and oedema of the brain, hypothalamic region; post-traumatic diabetes insipidus; chronic increased intracranial pressure.

The boy was apparently well up to six months ago, at which time he was struck by an automobile. Unconsciousness for four and one-half days and hospitalized for nine days, followed by rest in bed at home for several weeks. Shortly after going home increased thirst and increased quantity of urine was noted. Quantity reached to eight or ten quarts per day and then gradually decreased to the present level of about five or six quarts daily. Several times while reading he has noticed that the print appeared blurred for several moments. There seems to be a memory gap for a short period previous to the accident. He claims to have grown much taller since the accident but no fatter.

PHYSICAL EXAMINATION: The boy is well developed and well nourished, shows good color and appears to be in good general health. There is a two inch scar over the right frontal region and another over bridge of the nose.

NEUROLOGICAL EXAMINATION: Patient appears to be normal except that the reflexes are generally hyperactive but equal, pupils are large and some respiratory arrhythmia. There is flushing of the skin on stimulation.

URINE: Cloudy yellow; acid; sp. gr. 1010; no sugar nor albumen.

BLOOD: 100% Hgb.(S); 4,130,000 R.B.C.; 11,450 W.B.C.; Kahn negative; B.S. 75; pressure 128/70.

LUMBAR PUNCTURE: I.P. 170; dynamics normal; 28 cc. removed; F.P. 60; appearance normal; 0 W.B.C.; 0 R.B.C.; negative Ross-Jones and Pandy; Wasserman negative.

X-ray plates of the skull were negative.

Basal metabolic rate - 1% pulse 62.

A... S... P...; 3702,071; Male; Age 15; White; Single.

DIAGNOSIS: Old contusion and edema of the brain, hydrocephalus; post-

traumatic diabetes insipidus; chronic increased intracranial pressure.

The boy was apparently well up to six months ago, at which time he was

struck by an automobile. Unconsciousness for four and one-half days and hos-

pitalized for nine days, followed by rest in bed at home for several weeks.

Shortly after coming home increased thirst and increased quantity of urine was

noted. Quantity reached to eight or ten quarts per day and then gradually in-

creased to the present level of about five or six quarts daily. Several times

while reading he has noticed that the urine appeared blurred for several min-

utes. There seems to be a memory gap for a short period previous to the acci-

dent. He claims to have grown much taller since the accident but no father.

PHYSICAL EXAMINATION: The boy is well developed and well nourished, shows

good color and appears to be in good general health. There is a two inch

scar over the right frontal region and another over bridge of the nose.

NEUROLOGICAL EXAMINATION: Patient appears to be normal except that the re-

flexes are generally hyperactive but equal, pupils are large and some respi-

tory arrhythmia. There is flinching of the arms on stimulation.

URINE: Cloudy yellow; acid; sp. gr. 1.010; no sugar nor albumen.

BLOOD: 1000 Rbc.(s); 4,120,000 R.B.C.; 11,480 W.B.C.; Kahn negative; S.E. 75;

Pressure 128/70.

LABORATORY: I.P. 170; dynamics normal; 25 cc. removed; 7.7. 80; appear-

ance normal; 0 W.B.C.; 0 R.B.C.; negative Ross-Jones and Bandy;

Wassermann negative.

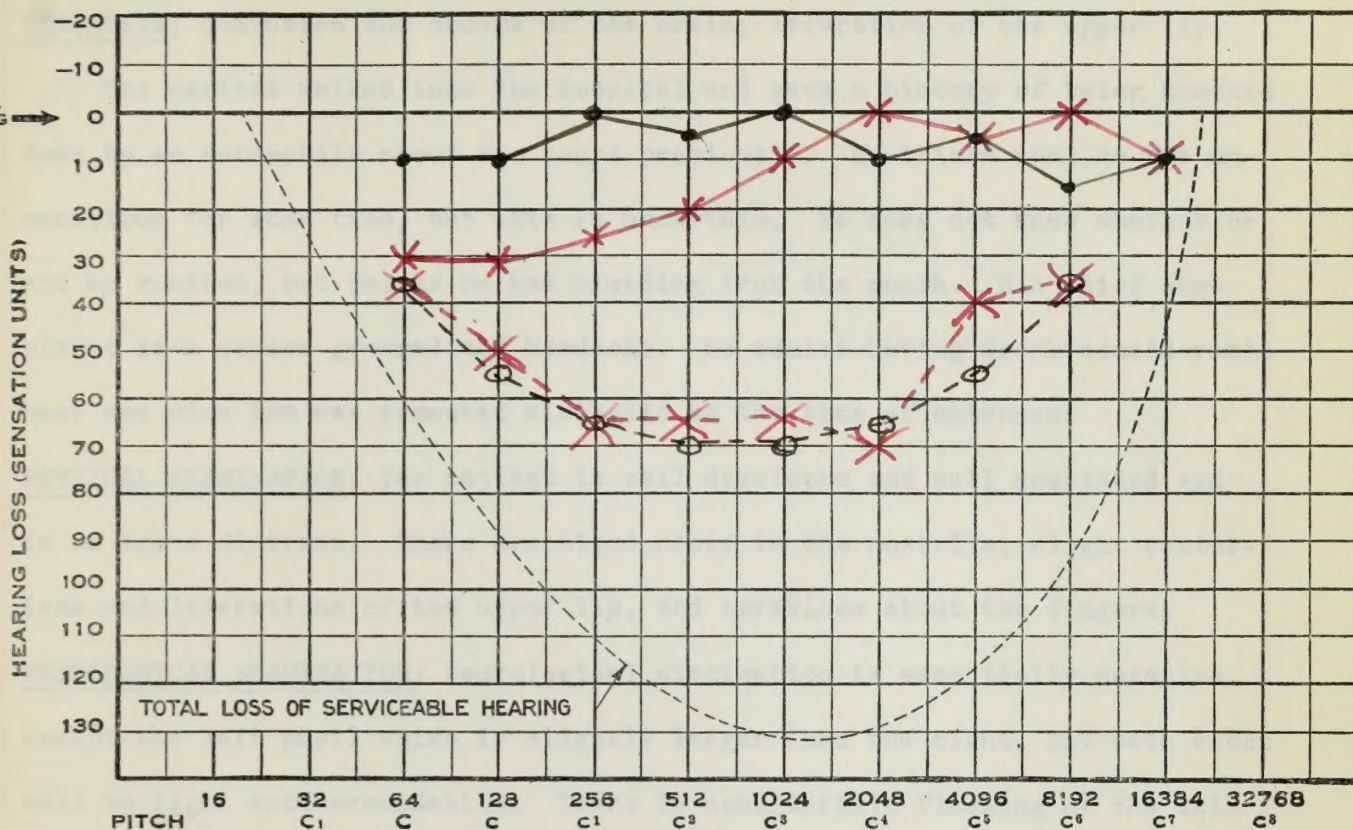
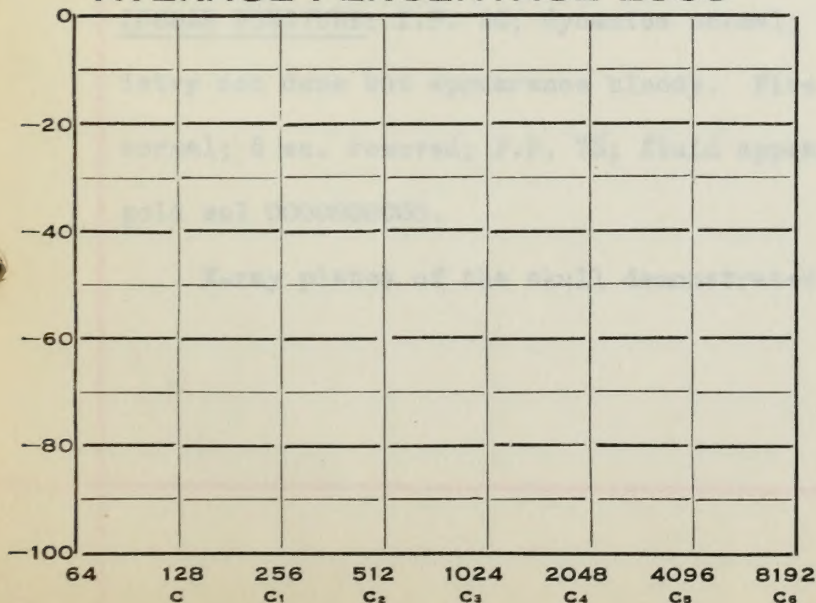
X-ray plates of the skull were negative.

Basal metabolic rate - 14 pulse 82.

EVANS MEMORIAL**AUDIOGRAM**NAME W. P.

697085

DATE..... 19.....

*Weber = at 4 Points***AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

..... Rinne AC

..... Weber

..... Upper Limit.....

..... Lower Limit.....

..... Whisper.....

..... Voice.....

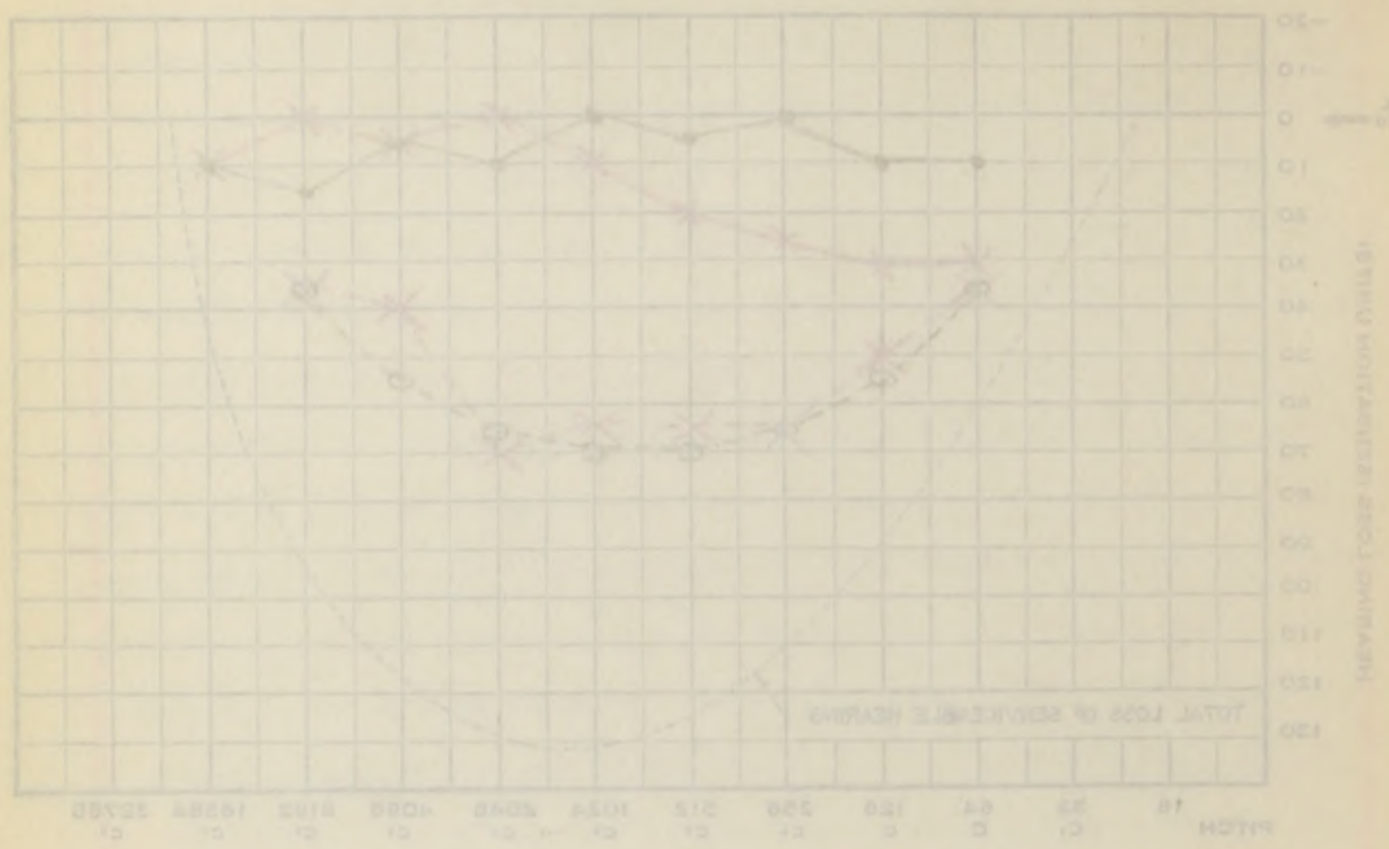
EVANS MEMORIAL

AUDIOGRAM

NAME W.E.

697082

DATE



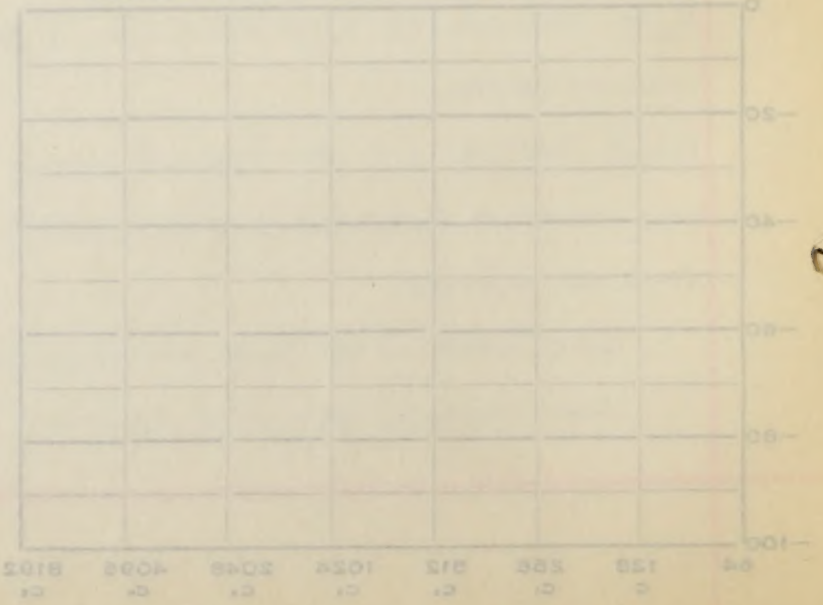
Frequency Hearing Loss

Right Ear

Left Ear

Weber = at 4 Points

AVERAGE PERCENTAGE LOSS



Diagnosis
Description
Date
1. Diagnosis
2. Date
3. Location
4. Time
5. Initials
6. Signature
Right
Left
Upper Limit
Lower Limit
Weber
Vibration

EVANS MEMORIAL

W... P...; #697,085; Male; Age 26; White; Single.

DIAGNOSIS: Contusion and oedema of the brain; laceration of the upper lip.

The patient walked into the hospital and gave a history of being knocked down by an automobile about two hours previously. He thinks that he was unconscious for some time, but this is uncertain. He does not know whether or not he vomited, but thinks he had bleeding from the mouth. His chief complaint is a severe generalized headache. He admits having drunk considerable beer and wine and was somewhat alcoholic at the time of entrance.

PHYSICAL EXAMINATION: The patient is well developed and well nourished and in no acute distress. There are blood clots in the nostrils, slight contusions and lacerations of the upper lip, and abrasions about the fingers.

NEUROLOGICAL EXAMINATION: Neurological examination is essentially negative except the left pupil which is slightly larger than the right, but both react well to light and accommodation. There is considerable flushing of the skin on stimulation.

URINE: Yellow; alkaline; sp. gr. 1025; no sugar nor albumen; few epithelial cells in the sediment.

BLOOD: 85% Hgb.(S); red cells not counted; 7,900 W.B.C.; Kahn negative; pressure 130/80.

LUMBAR PUNCTURE: I.P. 90; dynamics normal; 1/2 cc. removed; F.P. 80; chemistry not done but appearance bloody. Five days later: I.P. 120; dynamics normal; 5 cc. removed; F.P. 75; fluid appears yellow; protein 25 mg/100 cc.; gold sol 0000000000.

X-ray plates of the skull demonstrated no fracture present.

W... P...; 4887,088; Male; Age 24; White; Single.

DIAGNOSIS: Contusion and edema of the brain; laceration of the upper lip.

The patient walked into the hospital and gave a history of being knocked down by an automobile about two hours previously. He thinks that he was unconscious for some time, but this is uncertain. He does not know whether or not he vomited, but thinks he had bleeding from the mouth. His chief complaint is a severe generalized headache. He admits having drunk considerable beer and wine and was somewhat alcoholic at the time of entrance.

PHYSICAL EXAMINATION: The patient is well developed and well nourished and in no acute distress. There are blood clots in the nostrils, slight contusions and lacerations of the upper lip, and abrasions about the fingers.

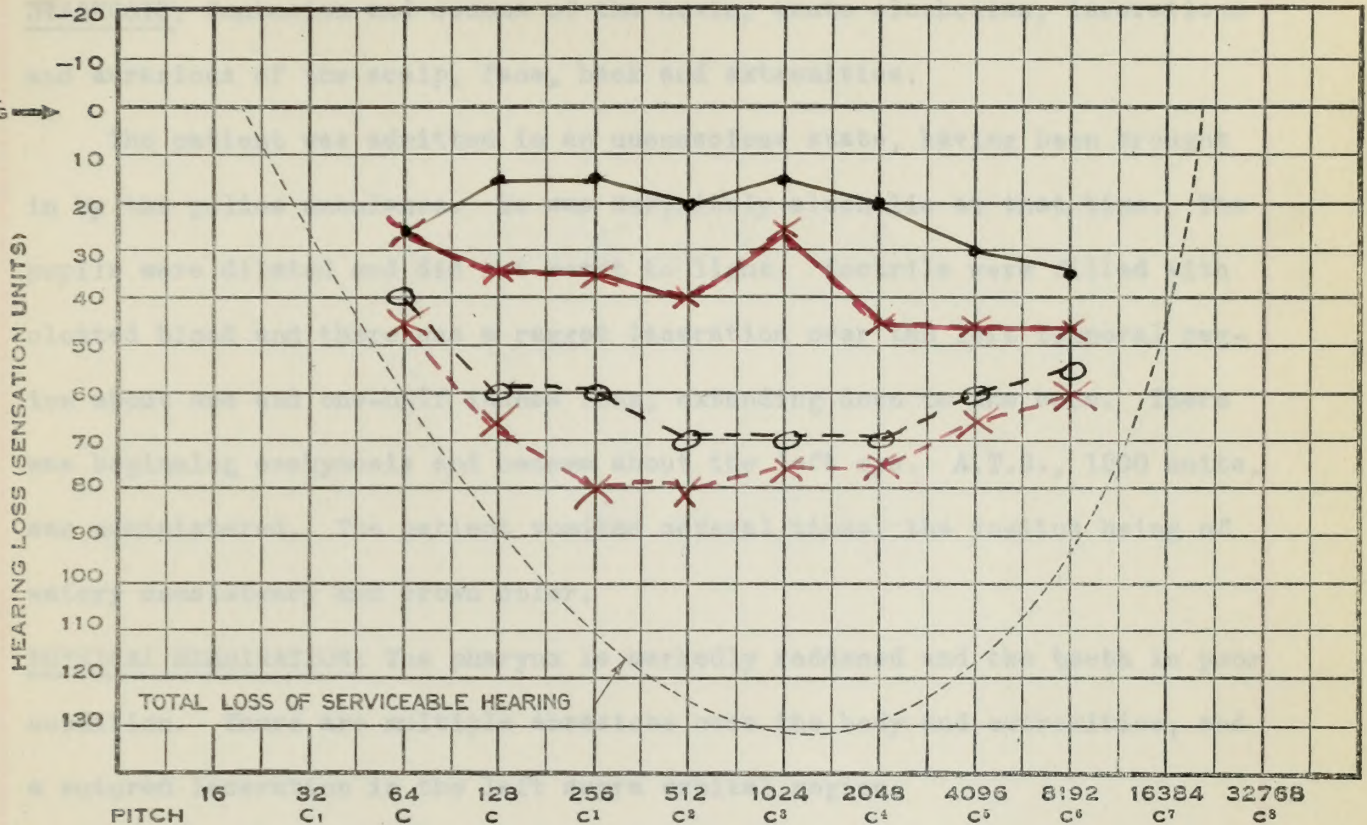
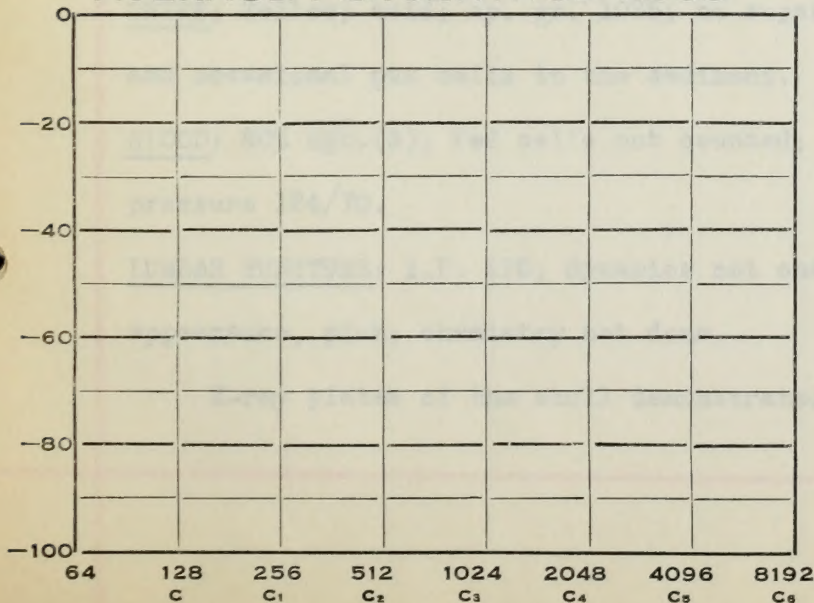
NEUROLOGICAL EXAMINATION: Neurological examination is essentially negative except the left pupil which is slightly larger than the right, but both react well to light and accommodation. There is considerable flushing of the skin on stimulation.

URINE: Yellow; alkaline; sp. gr. 1.025; no sugar nor albumen; few epithelial cells in the sediment.

BLOOD: 884 Hgb. (8); red cells not counted; 7,800 W.B.C.; Kahn negative; pressure 120/80.

LUMBAR PUNCTURE: I.P. 90; dynamics normal; 1 1/2 cc. removed; P.P. 80; chlamydia not done but appearance bloody. Five days later: I.P. 120; dynamics normal; 5 cc. removed; P.P. 75; fluid appears yellow; protein 25 mg/100 cc.; Gold sol 000000000.

X-ray plates of the skull demonstrated no fracture present.

EVANS MEMORIAL**AUDIOGRAM**NAME D.M. 700416
DATE..... 19.....**AVERAGE PERCENTAGE LOSS**Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

Rinne ^{AC}_{BC}

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

EVANS MEMORIAL

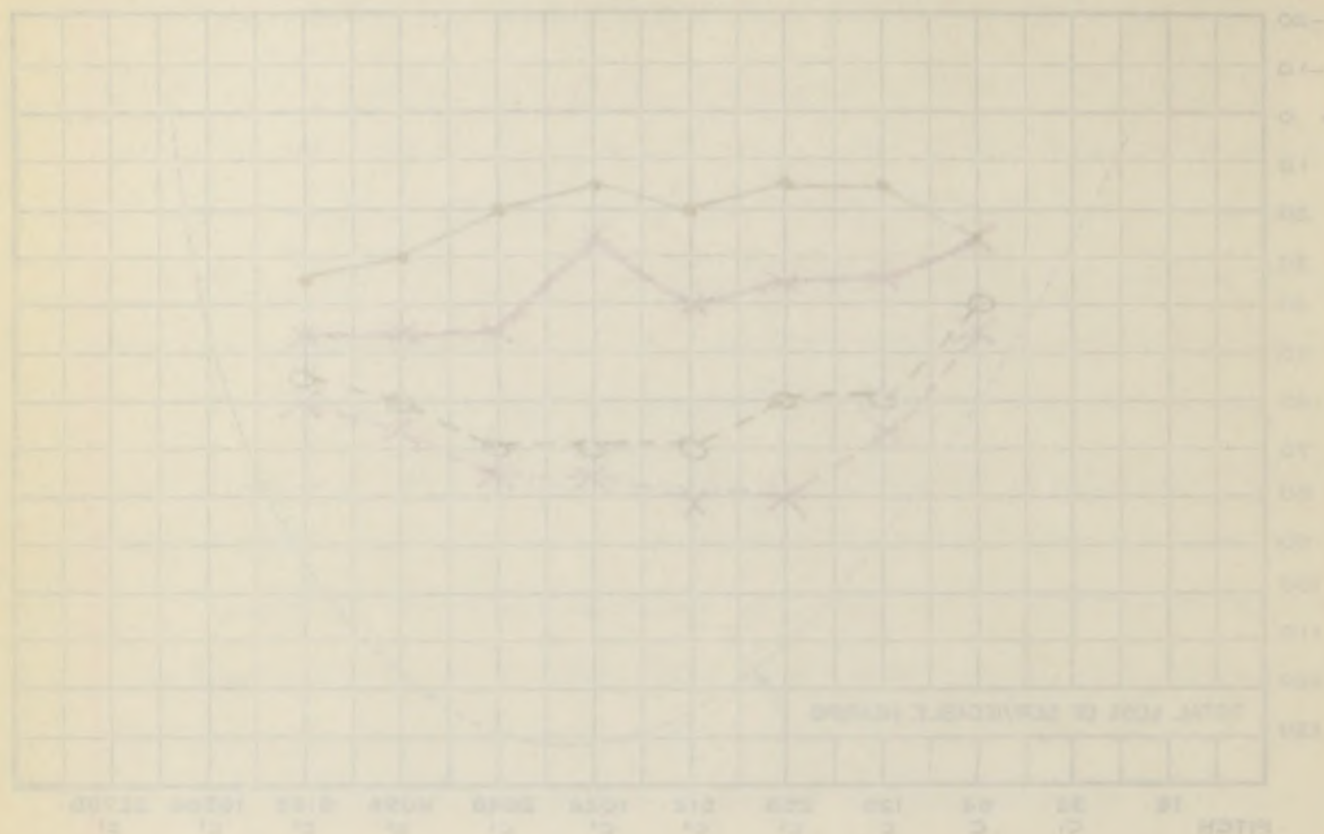
700416

D.M.

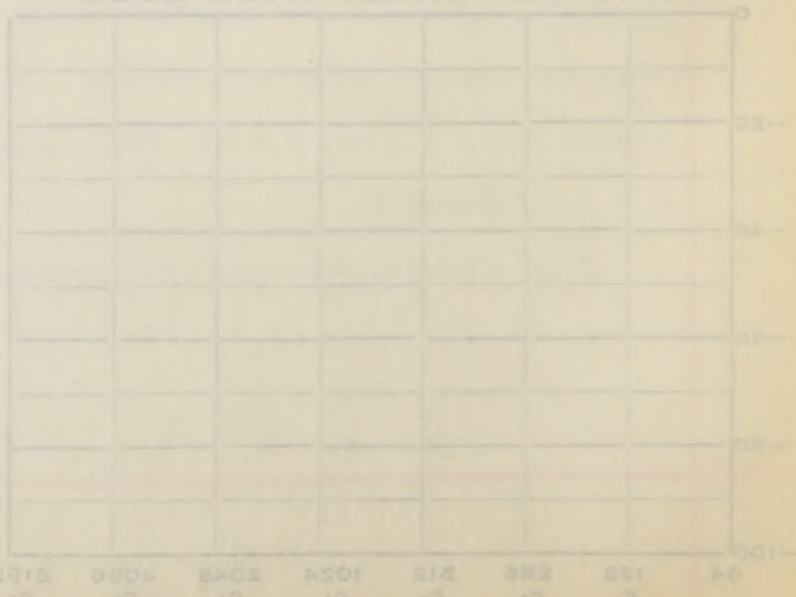
NAME

DATE

AUDIOGRAM



AVERAGE PERCENTAGE LOSS



Question _____
 Answer _____
 Chief Complaint _____
 1. History _____
 2. Age _____
 3. Occupation _____
 4. Training _____
 5. Habits _____
 6. Diseases _____
 7. Trauma _____
 8. Other _____
 9. Family _____
 10. Social _____
 11. Environmental _____
 12. Psychological _____
 13. Physical _____
 14. Chemical _____
 15. Biological _____
 16. Nutritional _____
 17. Hormonal _____
 18. Immune _____
 19. Genetic _____
 20. Other _____

D... M...; #700,416; Male; Age 28; White; Single.

DIAGNOSIS: Contusion and oedema of the brain; acute alcoholism; lacerations and abrasions of the scalp, face, back and extremities.

The patient was admitted in an unconscious state, having been brought in by the police ambulance. He was definitely alcoholic at that time. The pupils were dilated and did not react to light. Nostrils were filled with clotted blood and there was a ragged laceration over the left temporal region about one and one-half inches long, extending down to the bone. There was beginning ecchymosis and oedema about the left eye. A.T.S., 1500 units, was administered. The patient vomited several times, the vomitus being of watery consistency and brown color.

PHYSICAL EXAMINATION: The pharynx is markedly reddened and the teeth in poor condition. There are multiple abrasions over the body and extremities, and a sutured laceration in the left supra orbital region.

NEUROLOGICAL EXAMINATION: The patient remembers nothing of the twenty-four hours preceding his entry to the hospital nor of the twelve hours after arrival. Visual acuity is impaired in the left eye, apparently of long standing, but the fields appear roughly normal. Both ears are filled with wax. There is a fracture of the skull under the laceration but it is not depressed.

URINE: Yellow; acid; sp. gr. 1025; no sugar nor albumen; Phosphate, bacteria and occasional pus cells in the sediment.

BLOOD: 80% Hgb.(S); red cells not counted; 6,600 W.B.C.; Kahn negative; pressure 124/70.

LUMBAR PUNCTURE: I.P. 110; dynamics not checked; 1/2 cc. removed; F.P. 100; appearance, pink; chemistry not done.

X-ray plates of the skull demonstrated no fracture.

D... M...; 4700, 418; White; Age 28; Single.

DIAGNOSIS: Contusion and edema of the brain; acute alcoholism; lacerations and abrasions of the scalp, face, back and extremities.

The patient was admitted in an unconscious state, having been brought in by the police ambulance. He was definitely alcoholic at that time. The pupils were dilated and did not react to light. Scapulae were filled with clotted blood and there was a raised laceration over the left temporal region about one and one-half inches long, extending down to the bone. There was beginning tachycardia and edema about the left eye. A.T.S., 1800 units, was administered. The patient vomited several times, the vomitus being of watery consistency and brown color.

PHYSICAL EXAMINATION: The pharynx is markedly redness and the teeth in poor condition. There are multiple abrasions over the body and extremities, and a sutured laceration in the left supra-orbital region.

NEUROLOGICAL EXAMINATION: The patient remembers nothing of the twenty-four hours preceding his entry to the hospital nor of the twelve hours after arrival. Visual acuity is impaired in the left eye, apparently of long standing, but the fields appear roughly normal. Both ears are filled with wax.

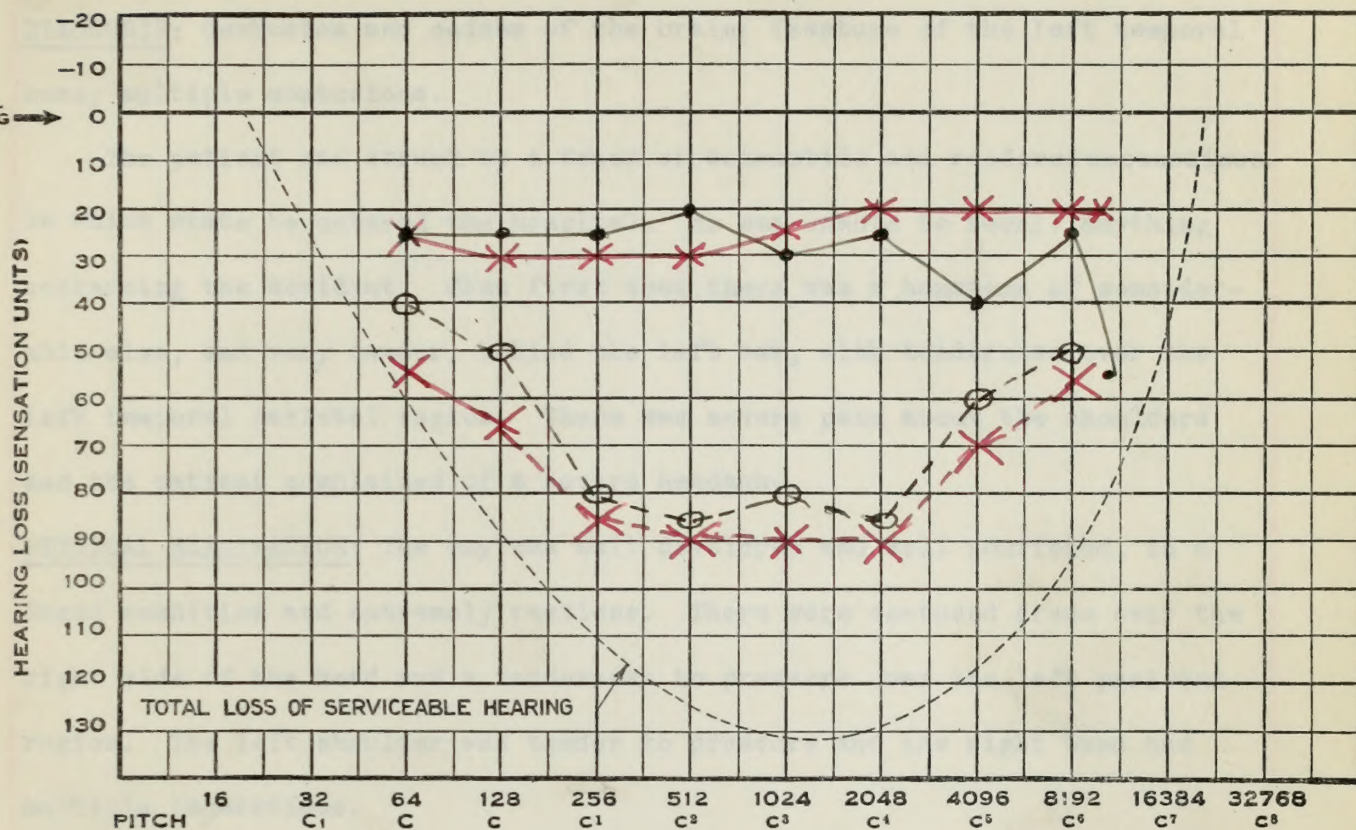
There is a fracture of the skull under the laceration but it is not depressed.

URINE: Yellow; acid; sp. gr. 1.025; no sugar nor albumen; Phosphate, bacteria and occasional pus cells in the sediment.

BLOOD: 802 Hgb.(2); red cells not counted; 5,800 W.B.C.; Kahn negative; pressure 124/70.

PULSAR FRACTURE: I.E. 110; dynamics not checked; 1/2 cc. removed; P.E. 100; appearance, pink; chemistry not done.

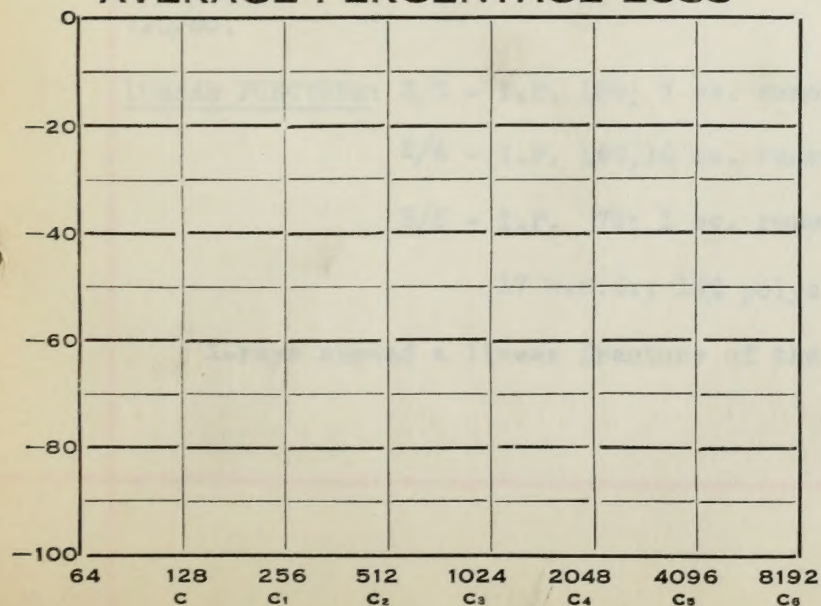
X-ray plates of the skull demonstrated no fracture.

EVANS MEMORIAL**AUDIOGRAM**NAME T. H. 698804
DATE.....19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber = at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

RightLeftRinne AC
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

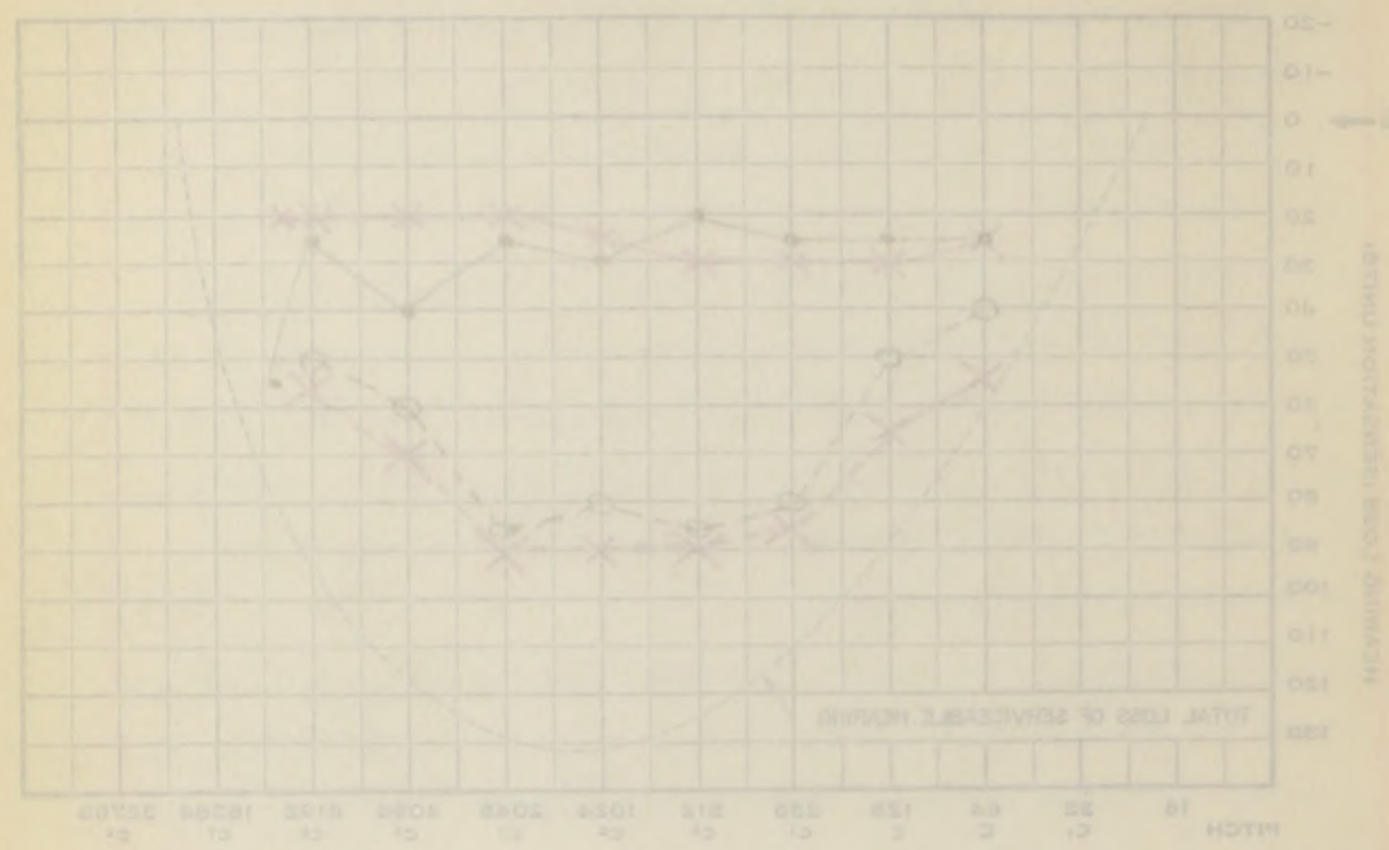
EVANS MEMORIAL

698864

H. H.

NAME
DATE

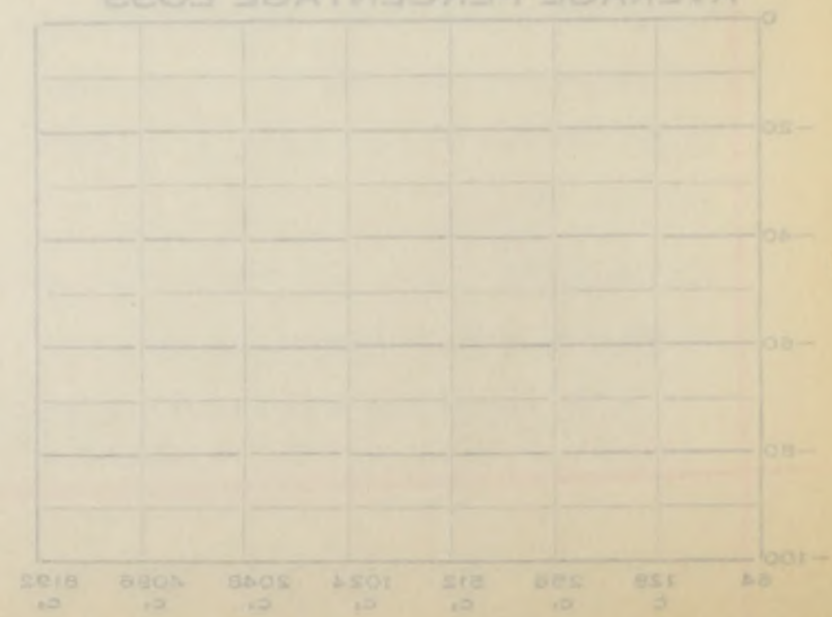
AUDIOGRAM



Frequency Hearing Loss
Right Ear
Left Ear

Webster - at H Points

AVERAGE PERCENTAGE LOSS



Diagnosis
Duration
Chief Complaint
1. History
2. Findings
3. Diagnosis
4. Treatment
5. Prognosis
6. Comments

Right
Left

AC
Rinne
Weber
Upper Limit
Lower Limit
Whisper
Voice

T... H...; #698,804; Male; Age 17; White; Single.

DIAGNOSIS: Contusion and oedema of the brain; fracture of the left temporal bone; multiple contusions.

The patient was struck by a truck or automobile and rendered unconscious in which state he entered the hospital. He was unable to recall anything concerning the accident. When first seen there was a hematoma of considerable size, and very tender, behind the left ear, with tenderness over the left temporal parietal region. There was severe pain about the shoulders and the patient complained of a severe headache.

PHYSICAL EXAMINATION: The boy was well developed and well nourished, in a dazed condition and extremely restless. There were contused areas over the right side of the head and a tenderness to pressure over the left parietal region. The left shoulder was tender to pressure and the right hand had multiple lacerations.

NEUROLOGICAL EXAMINATION: Due to the dazed condition it was impossible to make a complete examination. The neck was slightly stiff to complete flexion. The right pupil was slightly larger than the left.

URINE: Yellow; acid; no sugar nor albumen.

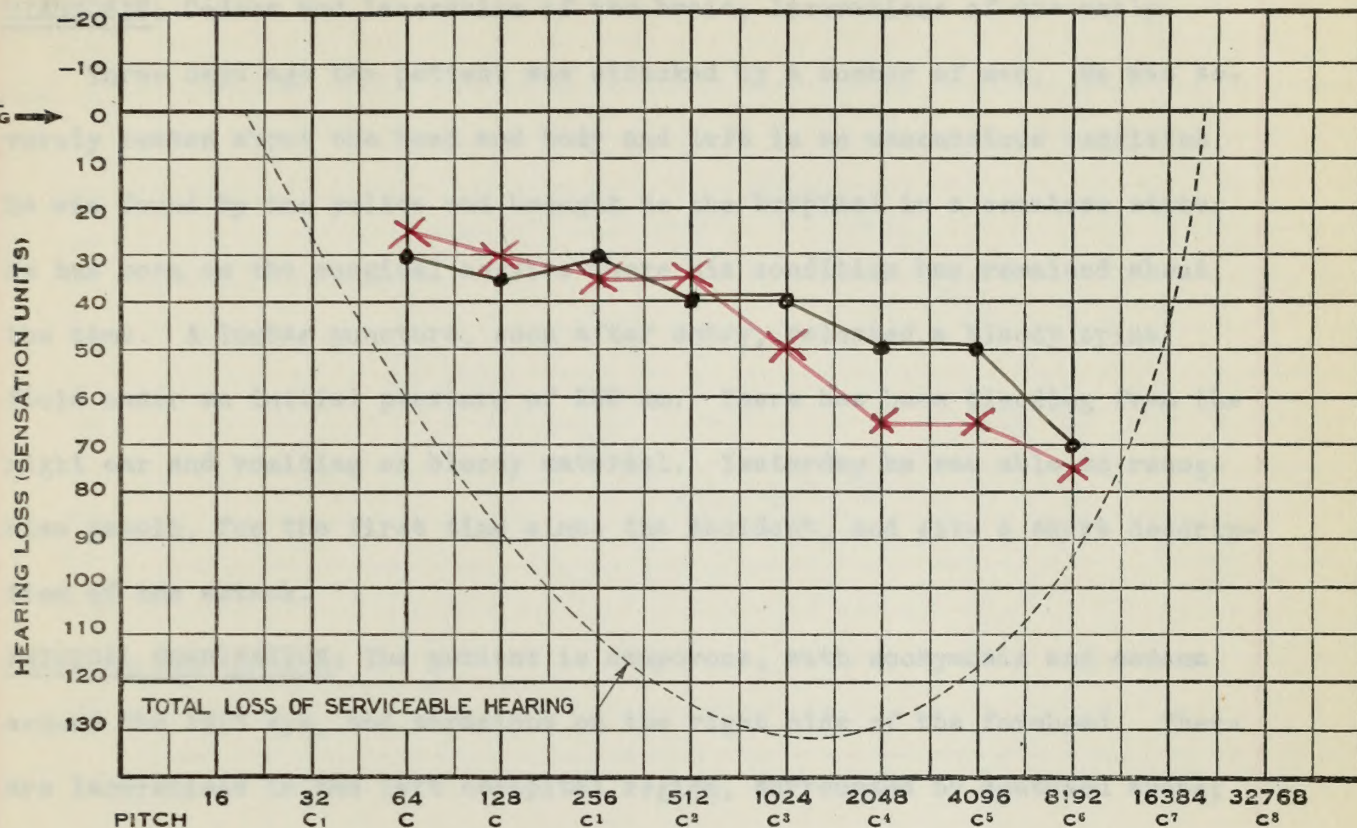
BLOOD: 90% Hgb.; 4,950,000 R.B.C.; 5,200 W.B.C.; Kahn negative; pressure 120/60.

LUMBAR PUNCTURE: 2/3 - I.P. 150; 7 cc. removed; F.P. 120; appearance bloody;
 2/4 - I.P. 190; 10 cc. removed; F.P. 100; app. blood tinged;
 2/5 - I.P. 75; 1 cc. removed; F.P. 50; app. brownish;
 17 W.B.C.; 12% polys; 2180 R.B.C.; Wasserman negative.

X-rays showed a linear fracture of the left temporal bone.

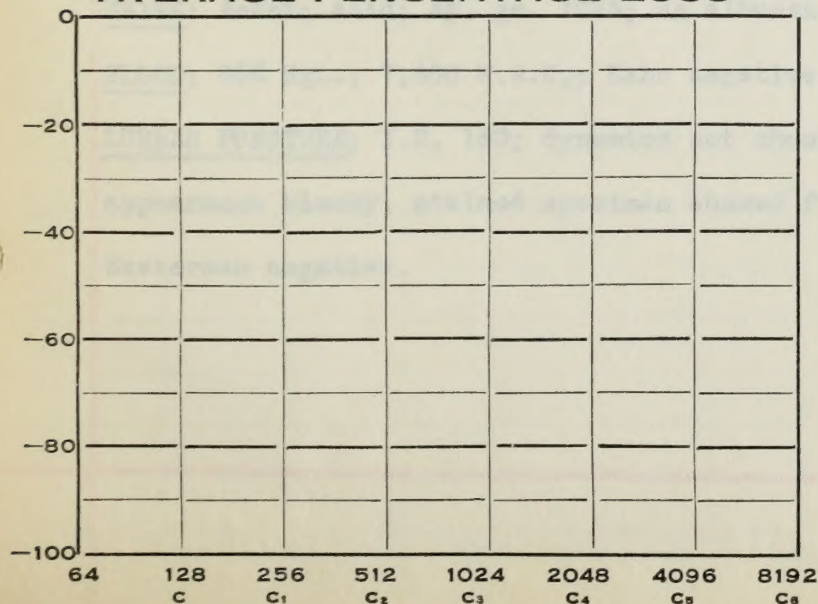
EVANS MEMORIAL

AUDIOGRAM

NAME D. M. 696 919
DATE _____ 19 _____

Weber Left at 4 Points

AVERAGE PERCENTAGE LOSS



Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right

Left

Rinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

D...M...; #696,919; Male; Age 38; White; Single.

DIAGNOSIS: Oedema and laceration of the brain; lacerations of the scalp.

Three days ago the patient was attacked by a number of men. He was severely beaten about the head and body and left in an unconscious condition. He was found by the police and brought to the hospital in a comatose state. He has been on the surgical service where his condition has remained about the same. A lumbar puncture, soon after entry, released a bloody spinal fluid under an initial pressure of 220 mm. There has been bleeding from the right ear and vomiting of bloody material. Yesterday he was able to recognize people, for the first time since the accident, and give a short description of the attack.

PHYSICAL EXAMINATION: The patient is stuporous, with ecchymosis and oedema around the left eye, and abrasions on the right side of the forehead. There are lacerations in the left occipital region, surrounded by contused areas; dried blood in the right auditory canal and multiple contusions and abrasions of the body and extremities.

NEUROLOGICAL EXAMINATION: In spite of stuporous condition the patient can answer questions. There is slight blurring of both discs. All reflexes are uniformly hypo-active.

URINE: Amber; acid; sp. gr. 1025; no albumen.

BLOOD: 85% Hgb.; 7,600 W.B.C.; Kahn negative; pressure 125/65.

LUMBAR PUNCTURE: I.P. 160; dynamics not checked; 15 cc. removed; F.P. 120; appearance bloody, stained specimen showed fluid loaded with red blood cells; Wasserman negative.

D...M...; 5568,918; Male; Age 38; White; Single.

DIAGNOSIS: Cerebral laceration of the brain; laceration of the scalp.

Three days ago the patient was attacked by a number of men. He was severely beaten about the head and body and left in an unconscious condition. He was found by the police and brought to the hospital in a comatose state. He has been on the surgical service where his condition has remained about the same. A further puncture, soon after entry, released a bloody spinal fluid under an initial pressure of 230 mm. There has been bleeding from the right ear and vomiting of bloody material. Yesterday he was able to respond to people, for the first time since the accident, and give a short description of the attack.

PHYSICAL EXAMINATION: The patient is stuporous, with nuchal rigidity and edema around the left eye, and abrasions on the right side of the forehead. There are lacerations in the left occipital region, surrounded by contused areas; dried blood in the right auditory canal and multiple contusions and abrasions of the body and extremities.

NEUROLOGICAL EXAMINATION: In spite of stuporous condition the patient can answer questions. There is slight shivering of both discs. All reflexes are uniformly hypo-active.

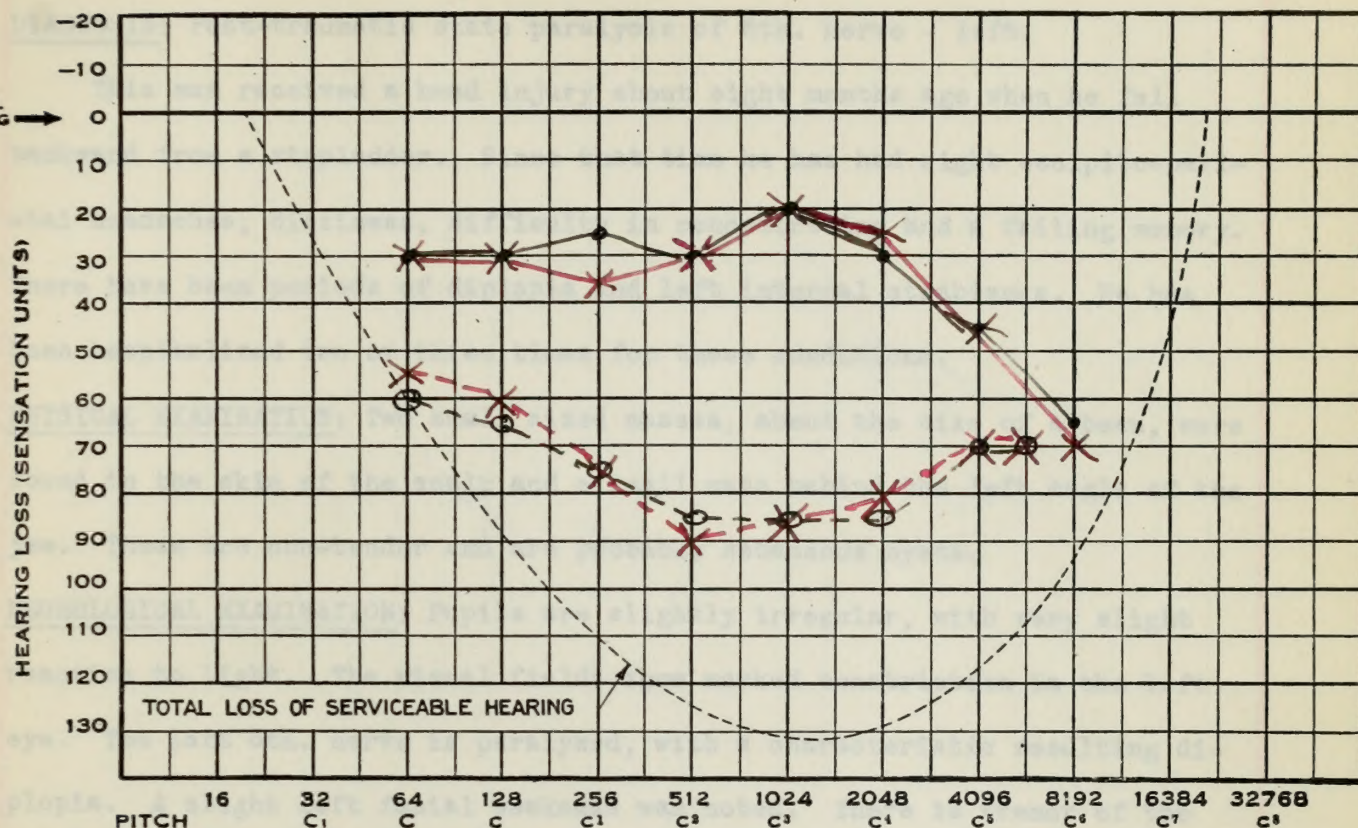
URINE: Amber; solid; sp. gr. 1.025; no albumen.

BLOOD: 88% Hgb.; 7,800 R.B.C.; Kahn negative; pressure 125/85.

LABORATORY: I.P. 180; dynamics not checked; 15 cc. removed; P.F. 120; appearance bloody, stained specimen showed fluid loaded with red blood cells; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**NAME S.F. 710 117

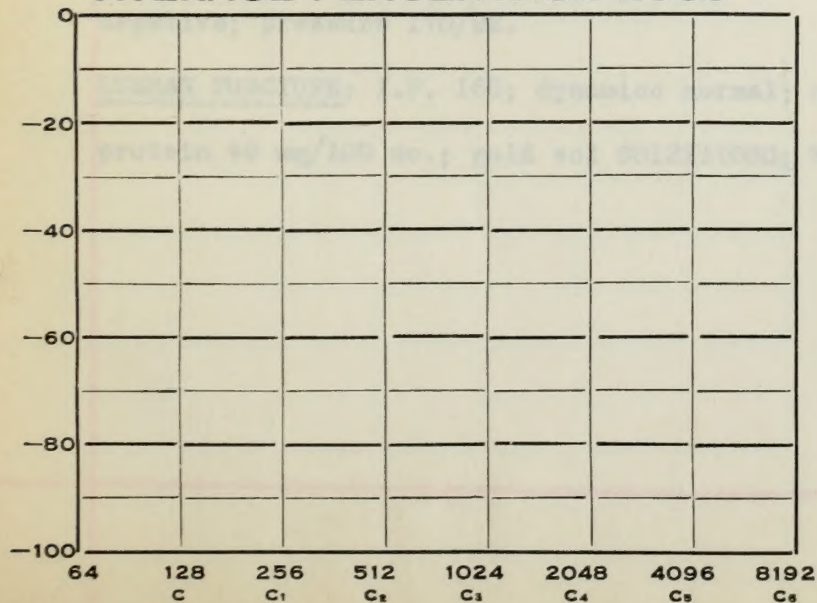
DATE..... 19.....



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber = at 4 Points.*

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper

Voice

EVANS MEMORIAL

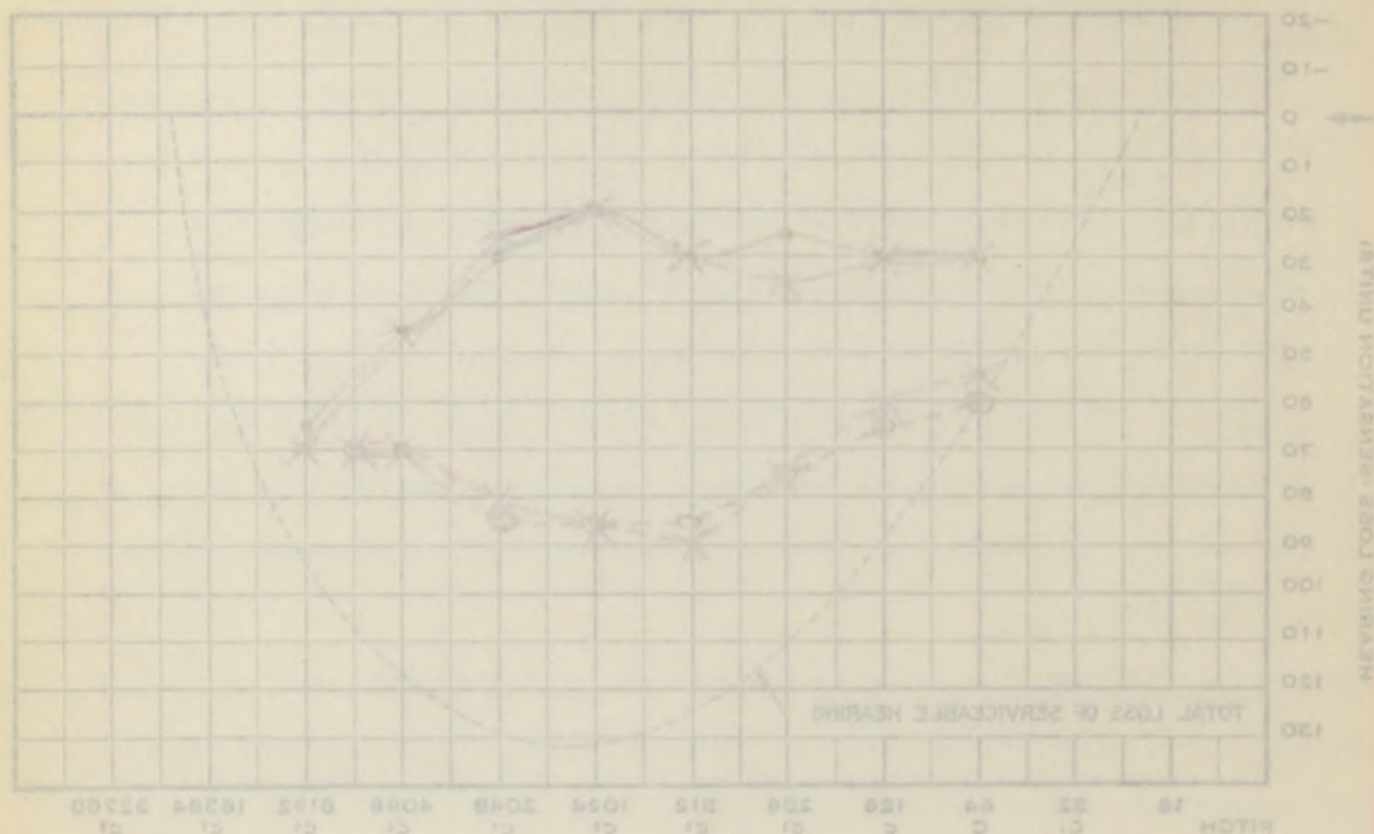
AUDIOGRAM

NAME

J.F.

DATE

19

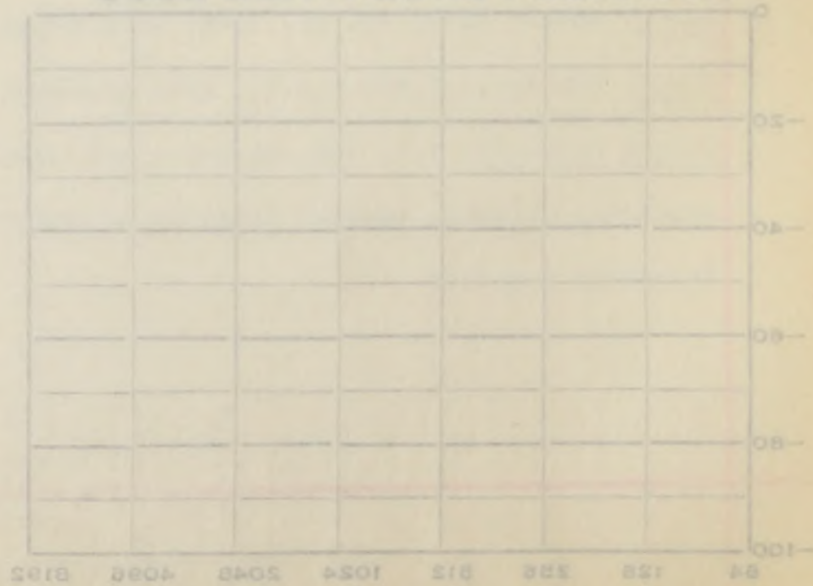


Frequency Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber = at 4 points.

Diagnosis

Duration

Chief Symptom

1. Deafness

2. Tinnitus

3. Discharge

4. Itching

5. Headache

6. Vertigo

Right

Left

Rose

BC

Weber

Upper limit

Lower limit

Whisper

Voice

J... F...; #710,117; Male; Age 62; White; Married.

DIAGNOSIS: Post-traumatic state paralysis of 6th. nerve - left.

This man received a head injury about eight months ago when he fell backward from a stepladder. Since that time he has had right occipito-parietal headaches, dizziness, difficulty in concentrating and a failing memory. There have been periods of diplopia and left internal strabismus. He has been hospitalized two or three times for these conditions.

PHYSICAL EXAMINATION: Two small sized masses, about the size of a bean, were found in the skin of the scalp and a small mass behind the left angle of the jaw. These are non-tender and are probably sebaceous cysts.

NEUROLOGICAL EXAMINATION: Pupils are slightly irregular, with very slight reaction to light. The visual fields show marked constriction in the left eye. The left 6th. nerve is paralyzed, with a characteristic resulting diplopia. A slight left facial weakness was noted. There is tremor of the arms in volitional movements. The deep reflexes are hyperactive but equal. There is a slight occipital tenderness. X-ray plates of the skull and encephalography reveal no abnormalities.

URINE: Yellow; acid; sp. gr. 1010; no sugar nor albumen; few W.B.C.

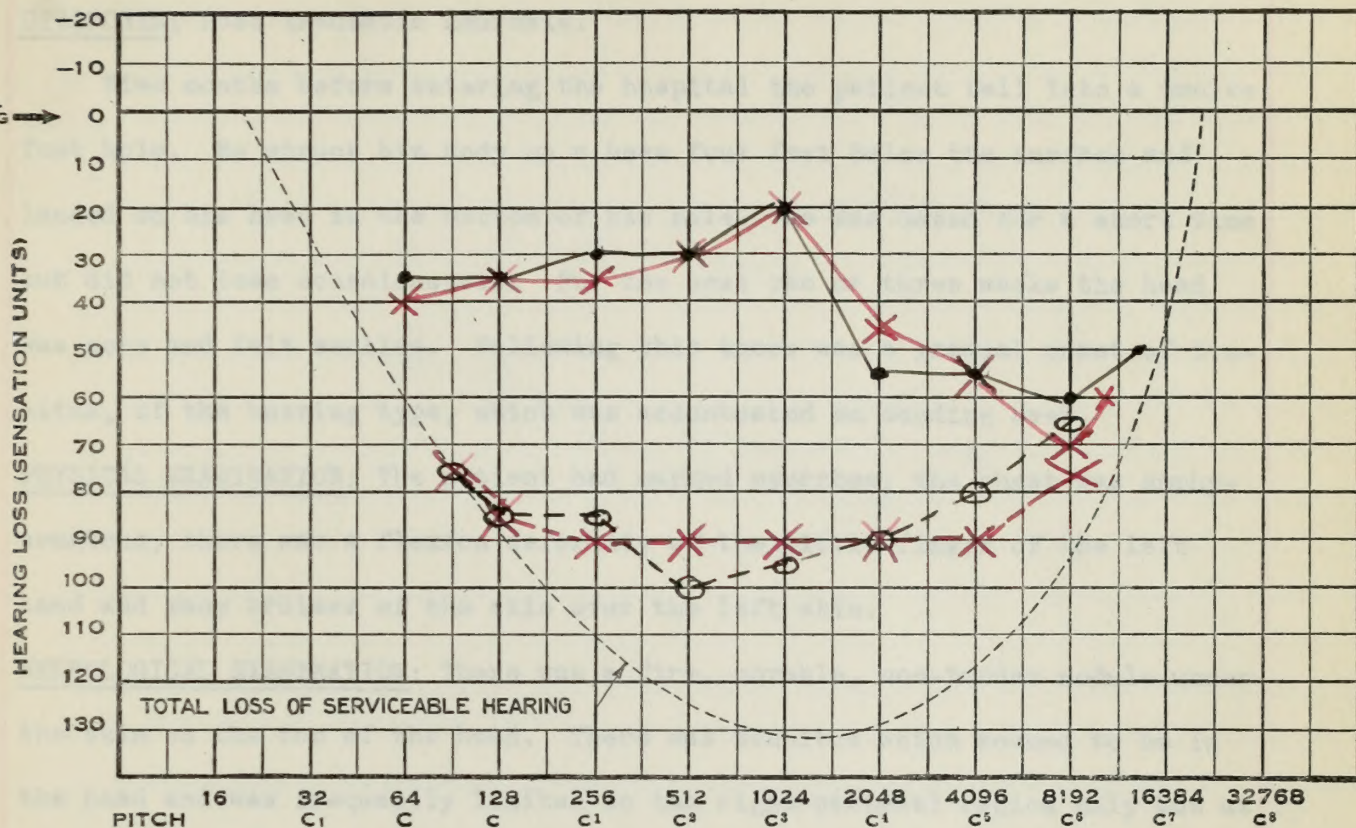
BLOOD: 55% Hgb.(T); 4,830,000 R.B.C.; 6,000 W.B.C.; slight achromia; Kahn negative; pressure 170/92.

LUMBAR PUNCTURE: I.P. 165; dynamics normal; no red or white blood cells; protein 49 mg/100 cc.; gold sol 0012211000; Wasserman negative.

EVANS MEMORIAL

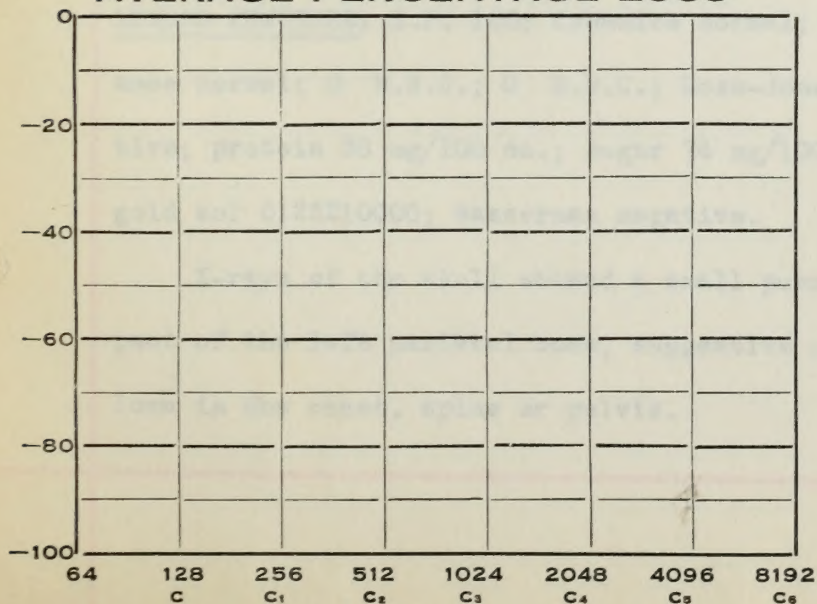
AUDIOGRAM

NAME A.A. 724691
DATE 19.....



Weber = at 4 Points

AVERAGE PERCENTAGE LOSS

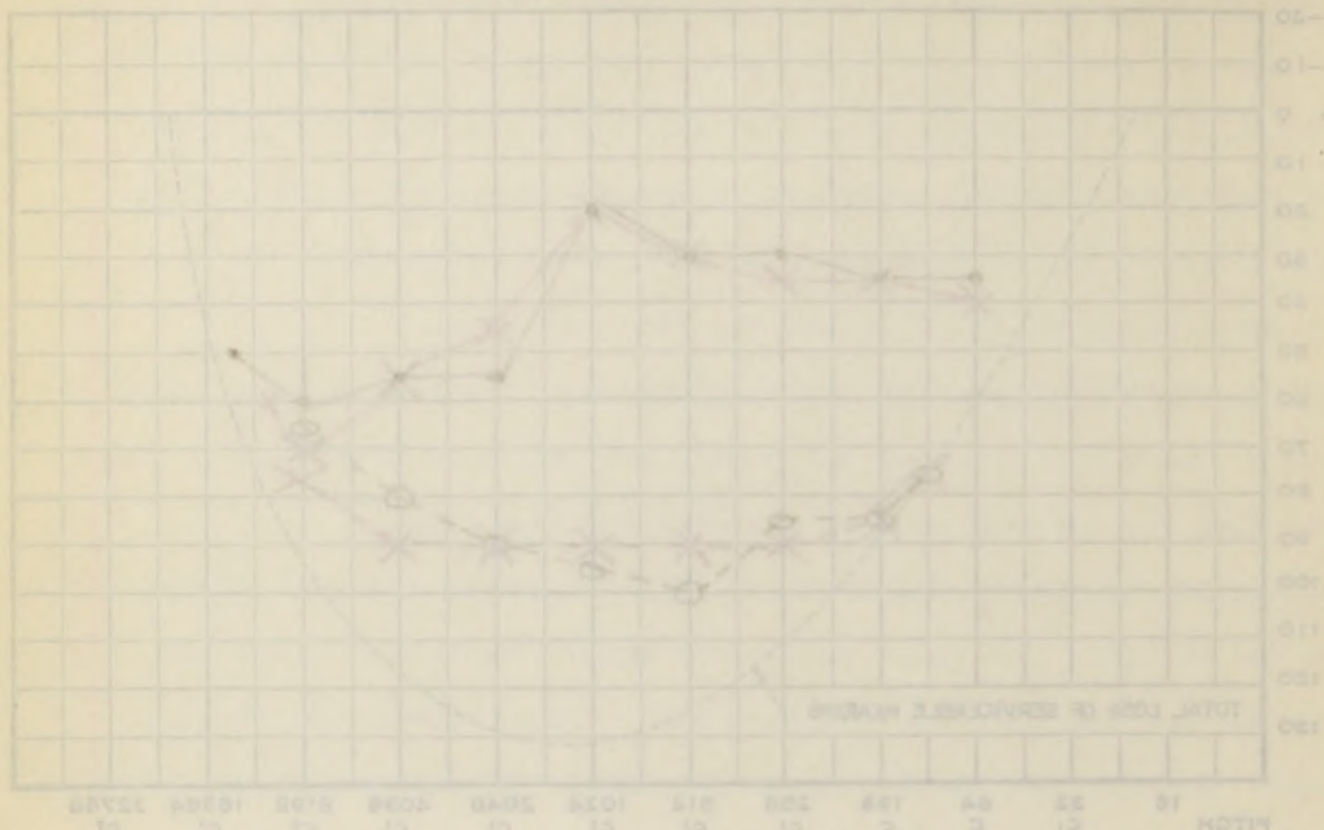


Disease
Duration
Chief Symptom.....
1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....
Right Left
Rinne AC
BC
Weber
Upper Limit.....
Lower Limit.....
Whisper.....
Voice.....

EVANS MEMORIAL

AUDIOGRAM

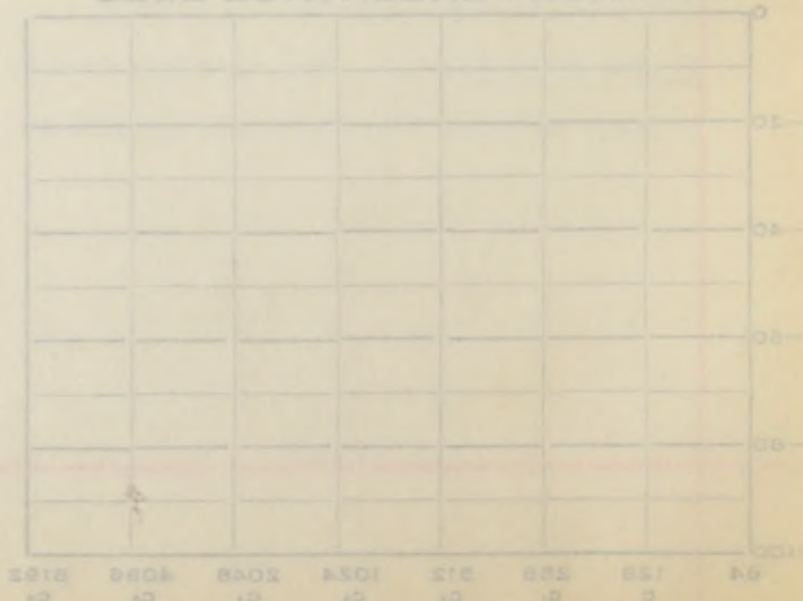
NAME A.A.
DATE 12/19/41



Percentage Hearing Loss
Right Ear
Left Ear

Webster with Points

AVERAGE PERCENTAGE LOSS



Diagnosis
Description
Chief Complaint
1. History
2. Physical
3. Examination
4. Treatment
5. Results
6. Comments

Right
Left

Plane
Webster
Upper Limit
Lower Limit
Whisper
Voice

A... A... ; #743,990; Male; Age 53; White; Married.

DIAGNOSIS: Post traumatic neurosis.

Five months before entering the hospital the patient fell into a twelve foot hole. He struck his body on a beam four feet below the surface and landed on his head in the bottom of the hole. He was dazed for a short time but did not lose consciousness. For the next two or three weeks the head was sore and felt swollen. Following this there was a gradual onset of tinnitus, of the buzzing type, which was accentuated on bending over.

PHYSICAL EXAMINATION: The patient had marked pyorrhea; the chest was emphysematous; there was a flexion deformity of the little finger of the left hand and many bruises of the skin over the left shin.

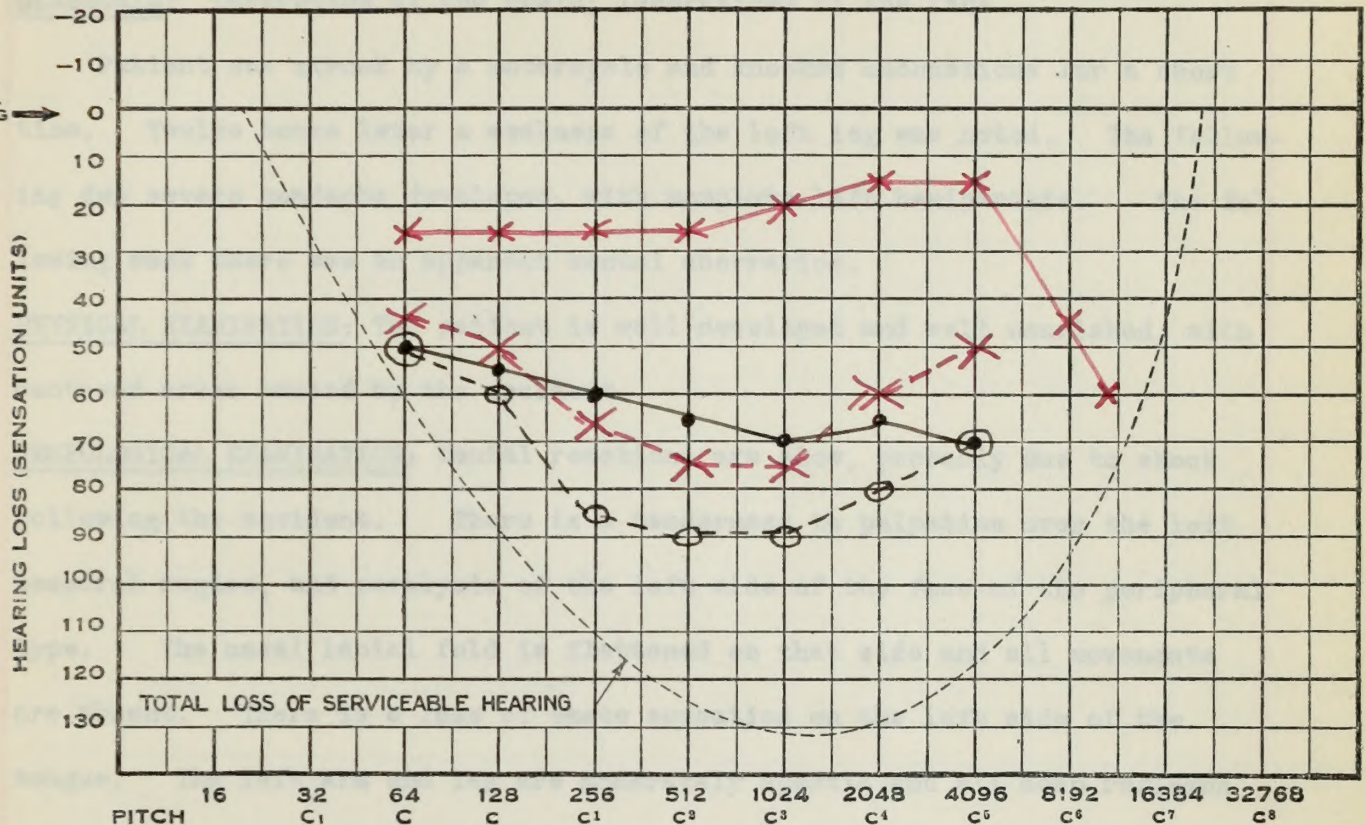
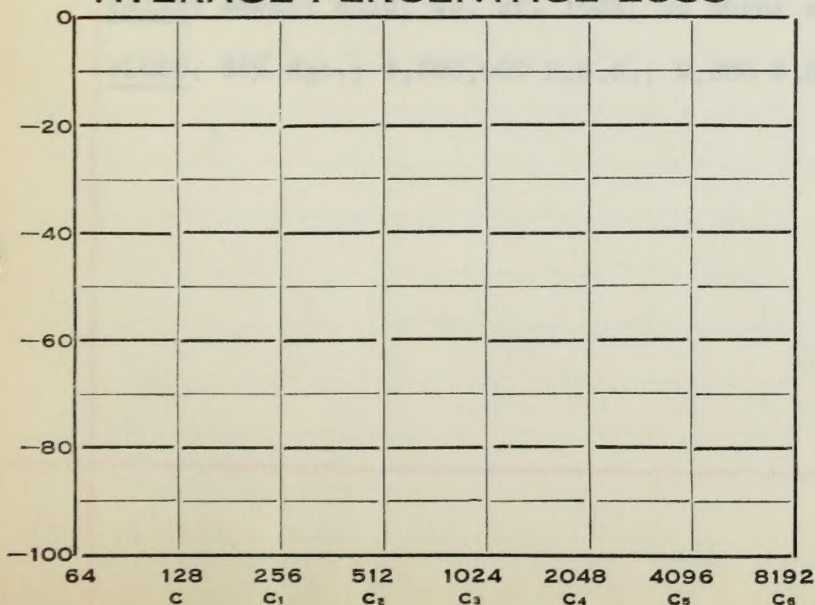
NEUROLOGICAL EXAMINATION: There was a firm, movable, non-tender nodule under the skin on the top of the head. There was tinnitus which seemed to be in the head and was frequently limited to the right parietal region only but at other times spread over the entire head. The patient reported that it seemed to be synchronous with the pulse. No bruit could be heard. The reflexes were normal, with the exception of the right abdominals which were sluggish.

URINE: Straw, cloudy; alkaline; sp. gr. 1010; no sugar nor albumen.

BLOOD: 92% Hgb.; 4,800,000 R.B.C.; 9,000 W.B.C.; Kahn negative; pr. 146/90.

LUMBAR PUNCTURE: I.P. 150; dynamics normal; 25 cc. removed; F.P. 60; appearance normal; 0 W.B.C.; 0 R.B.C.; Ross-Jones negative; Pandy slightly positive; protein 38 mg/100 cc.; sugar 74 mg/100 cc.; chloride 694 mg/100 cc.; gold sol 0123210000; Wasserman negative.

X-rays of the skull showed a small puncture hole in the posterior aspect of the left parietal bone, suggestive of myeloma. No evidence of myeloma in the chest, spine or pelvis.

EVANS MEMORIAL**AUDIOGRAM**NAME J.S. 730 178
DATE..... 19.....**AVERAGE PERCENTAGE LOSS***Weber Left at 4 Points*Disease
Duration
Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

Rinne $\frac{AC}{BC}$

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

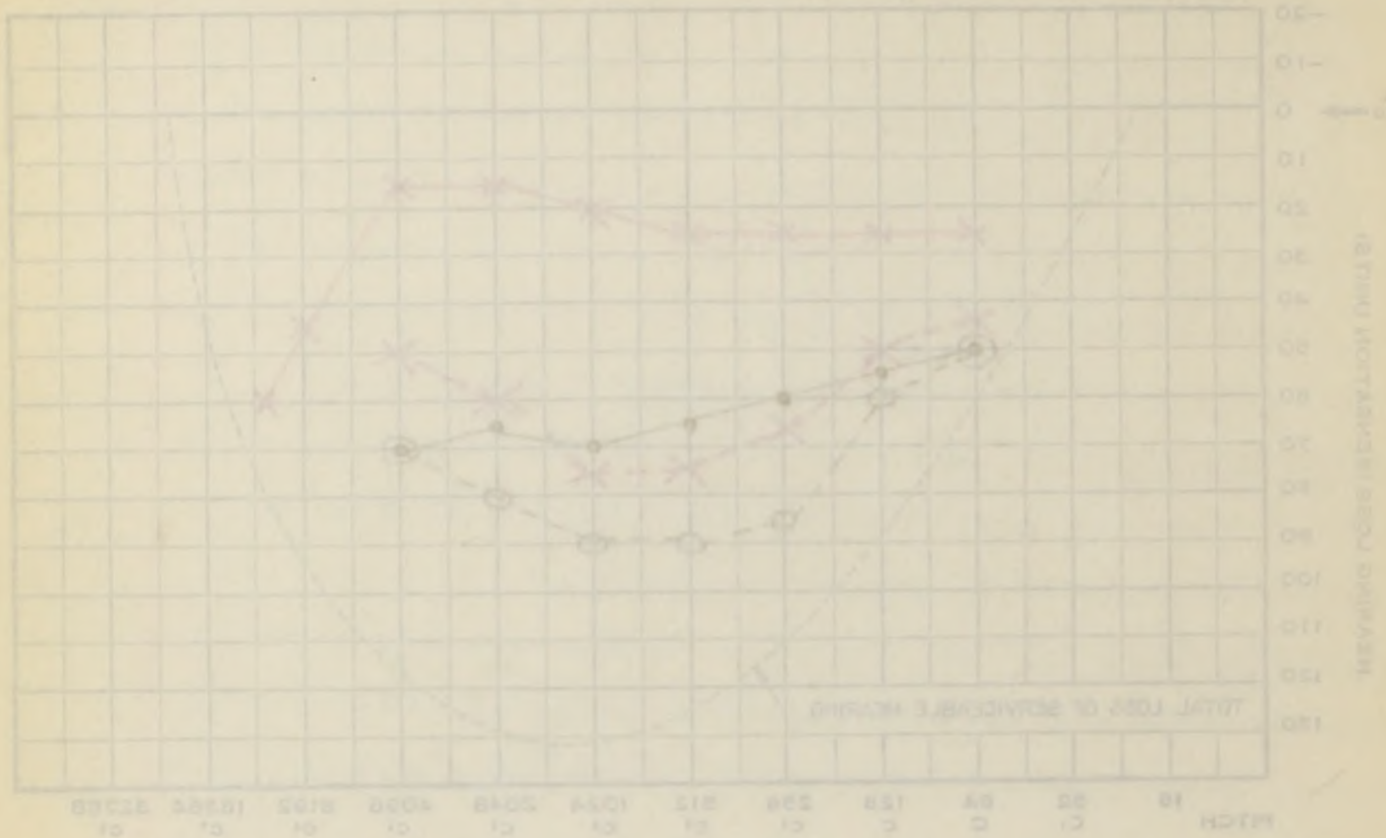
720 178

A.S.

NAME

DATE

AUDIOGRAM



J...S...; #730,178; Male; Age 43; White; Single.

DIAGNOSIS: Laceration of the brain; lacerations of the face.

Patient was struck by a motorcycle and knocked unconscious for a short time. Twelve hours later a weakness of the left leg was noted. The following day severe headache developed, with complete left hemiparesis. The following week there was an apparent mental aberration.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, with contused areas caused by the accident.

NEUROLOGICAL EXAMINATION: Mental reactions are slow, probably due to shock following the accident. There is a tenderness to palpation over the left temporal region, and paralysis of the left side of the face of the peripheral type. The nasal labial fold is flattened on that side and all movements are absent. There is a loss of taste sensation on the left side of the tongue. The left arm and leg are moderately spastic and all deep reflexes are hyperactive, more so on the left, with a definite Babinski. There is a marked hearing disturbance on the left.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 20 cc. removed; F.P. 60; appearance xanthochromic; 96 W.B.C.; 80% polys; 320 R.B.C.; protein 180 mg/100cc.; gold sol 0001231100.

URINE: Amber; acid; sp. gr. 1022; no sugar nor albumen.

BLOOD: 85% Hgb.; 4,300,000 R.B.C.; 9,800 W.B.C.; pr. 114/68; Kahn negative.

J.S...; W30,178; Male; Age 43; White; Single.

DIAGNOSIS: Laceration of the brain; lacerations of the face.

Patient was struck by a motorcycle and knocked unconscious for a short time. Twelve hours later a weakness of the left leg was noted. The following day severe headache developed, with complete left hemiparesis. The following week there was an apparent mental aberration.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, with

concussed areas caused by the accident.

NEUROLOGICAL EXAMINATION: Mental reactions are slow, probably due to shock

following the accident. There is a tenderness to palpation over the left

temporal region, and paralysis of the left side of the face of the peripheral

type. The nasal labial fold is flaccid on that side and all movements

are absent. There is a loss of taste sensation on the left side of the

tongue. The left arm and leg are moderately spastic and all deep reflexes

are hyperactive, more so on the left, with a definite Babinski. There is a

marked hearing disturbance on the left.

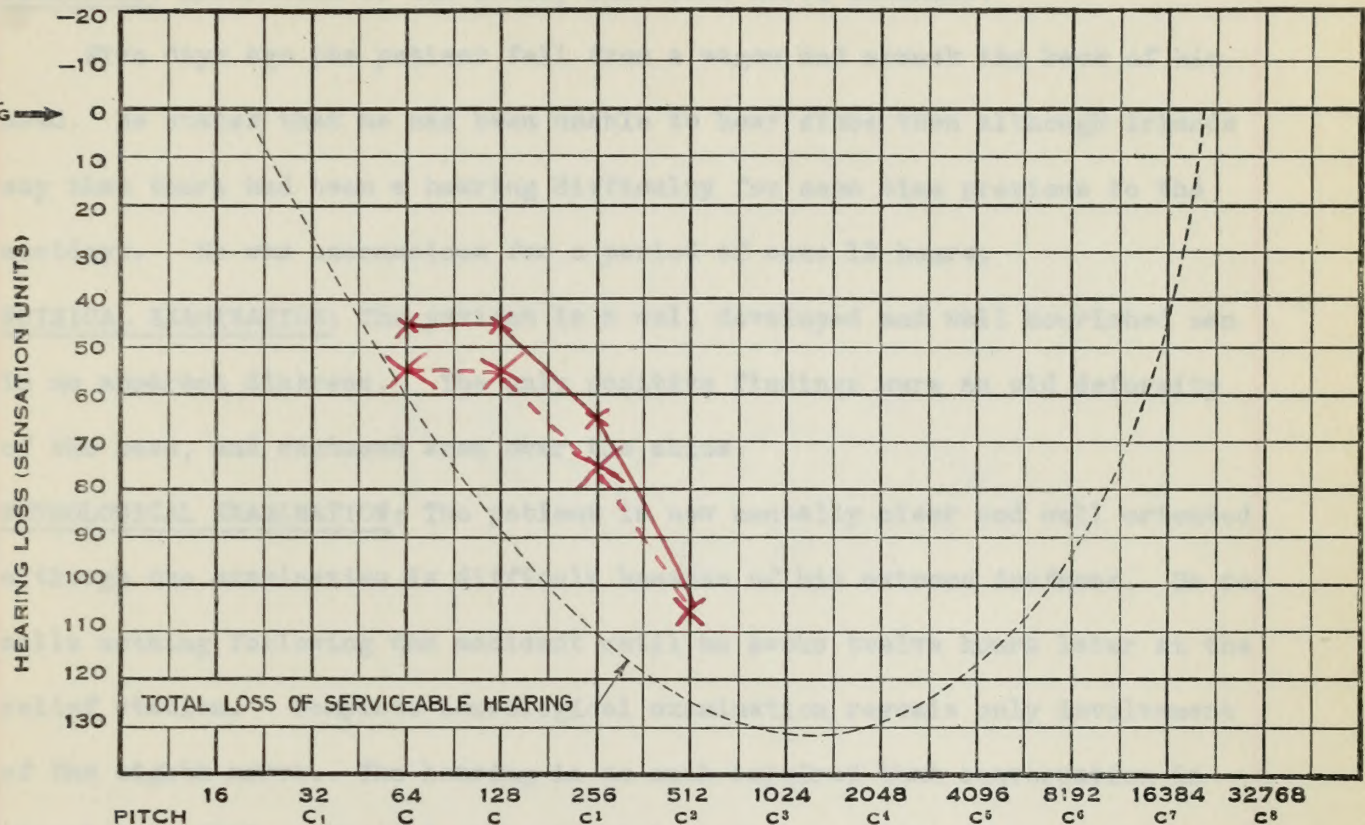
LABORATORY: I.P. 120; dysmetria normal; 20 cc. removed; F.F. 80; appear-

ance xanthochromic; 98 W.B.C.; 806 polys; 230 R.B.C.; protein 180 mg/100cc.

Gold sol 0001221100.

URINE: Amber; acid; sp. gr. 1.022; no sugar nor albumen.

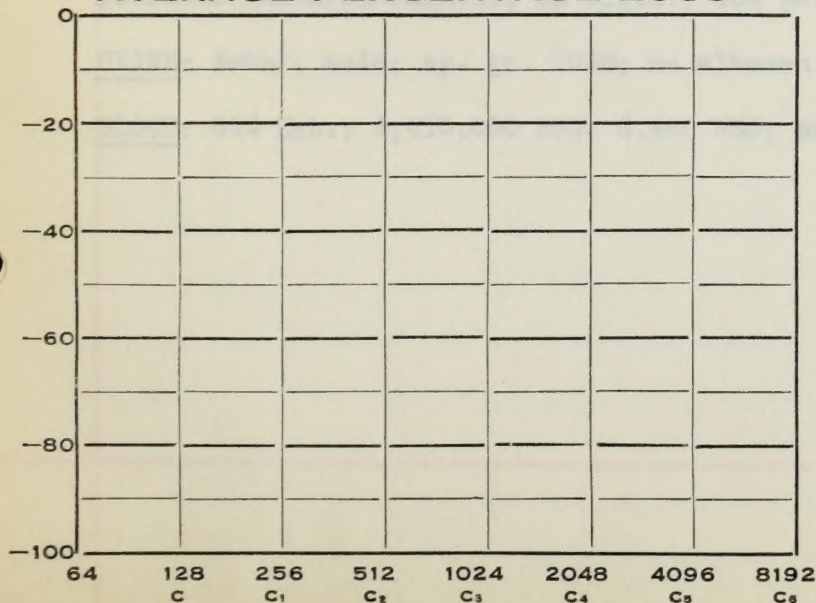
BLOOD: 98% Hgb.; 4,300,000 R.B.C.; 8,800 W.B.C.; pr. 114/66; Kahn negative.

EVANS MEMORIAL**AUDIOGRAM**NAME C.S. 727191
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

*No Hearing Remaining
in Left Ear***AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

RightLeftRinne AC
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

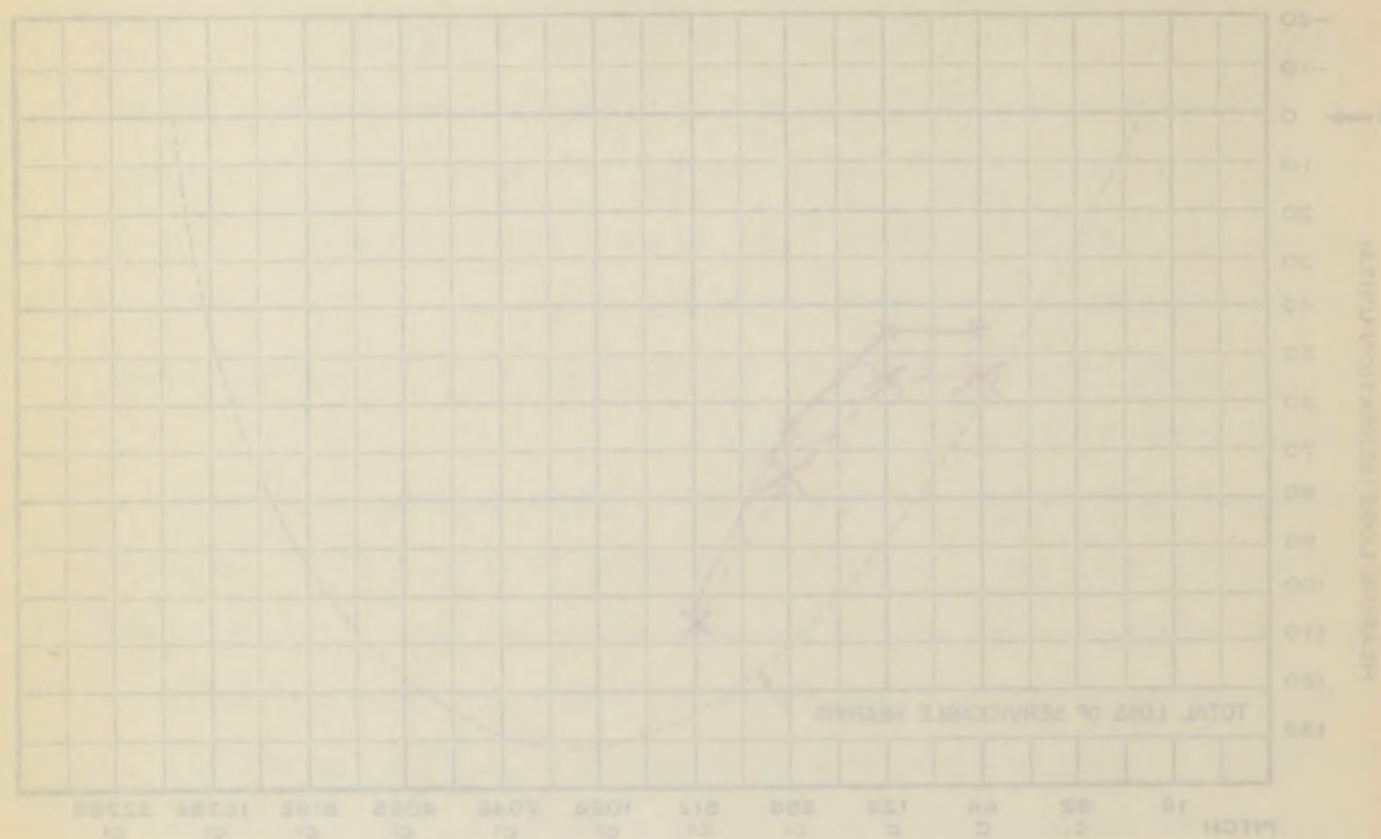
Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME: S.S.
DATE: 7-27-1971

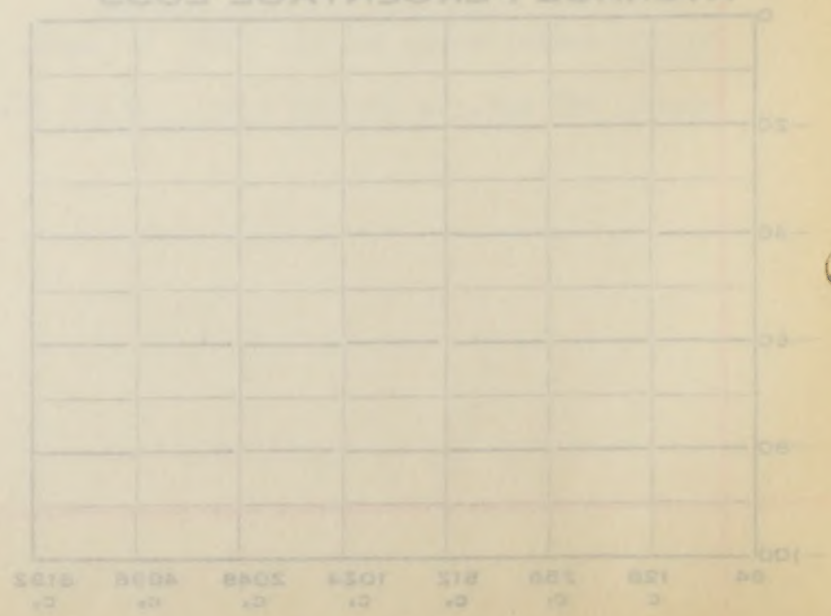
727 191



Previous Hearing Loss
Right Ear
Left Ear

No Hearing Remaining
in Left Ear

AVERAGE PERCENTAGE LOSS



Evans
Location
Chief Physician
J. Hoffman
S. Pyle
J. Glickman
J. Tamm
J. Hershman
J. Friedman
Ref:
Blind
Water
Upper limb
Lower limb
Whisper
Voice

C...S...; #727,191; Male; Age 55; White.

DIAGNOSIS: Laceration of the brain; bilateral nerve deafness.

Five days ago the patient fell from a wagon and struck the back of his head. He states that he has been unable to hear since then although friends say that there had been a hearing difficulty for some time previous to the accident. He was unconscious for a period of some 12 hours.

PHYSICAL EXAMINATION: The patient is a well developed and well nourished man in no apparent distress. The only positive findings were an old deformity of the nose, and contused area over the shins.

NEUROLOGICAL EXAMINATION: The patient is now mentally clear and well oriented although the examination is difficult because of his extreme deafness. He recalls nothing following the accident until he awoke twelve hours later at the relief station. Complete neurological examination reveals only involvement of the eighth nerve. The hearing is so much impaired that conversation is almost impossible. There is a horizontal nystagmus which is more marked on looking to the left. All reflexes are normal with the exception of the ankle jerk which was not obtained on the left. X-rays of the skull show no evidence of a fracture.

LUMBAR PUNCTURE: I.P. 85; dynamics not checked; 8 cc. removed; F.P. 55; appearance xanthochromatic; 25 W.B.C.; 60% polys; 4,000 R.B.C.

URINE: Amber; acid; sp. gr. 1020; no albumen but trace of sugar.

BLOOD: 85% Hgb.; 4,410,000 RBC; 6,400 WBC; pr. 130/70; Kahn negative.

...S...; WZY, 191; wife; Age 55; White.

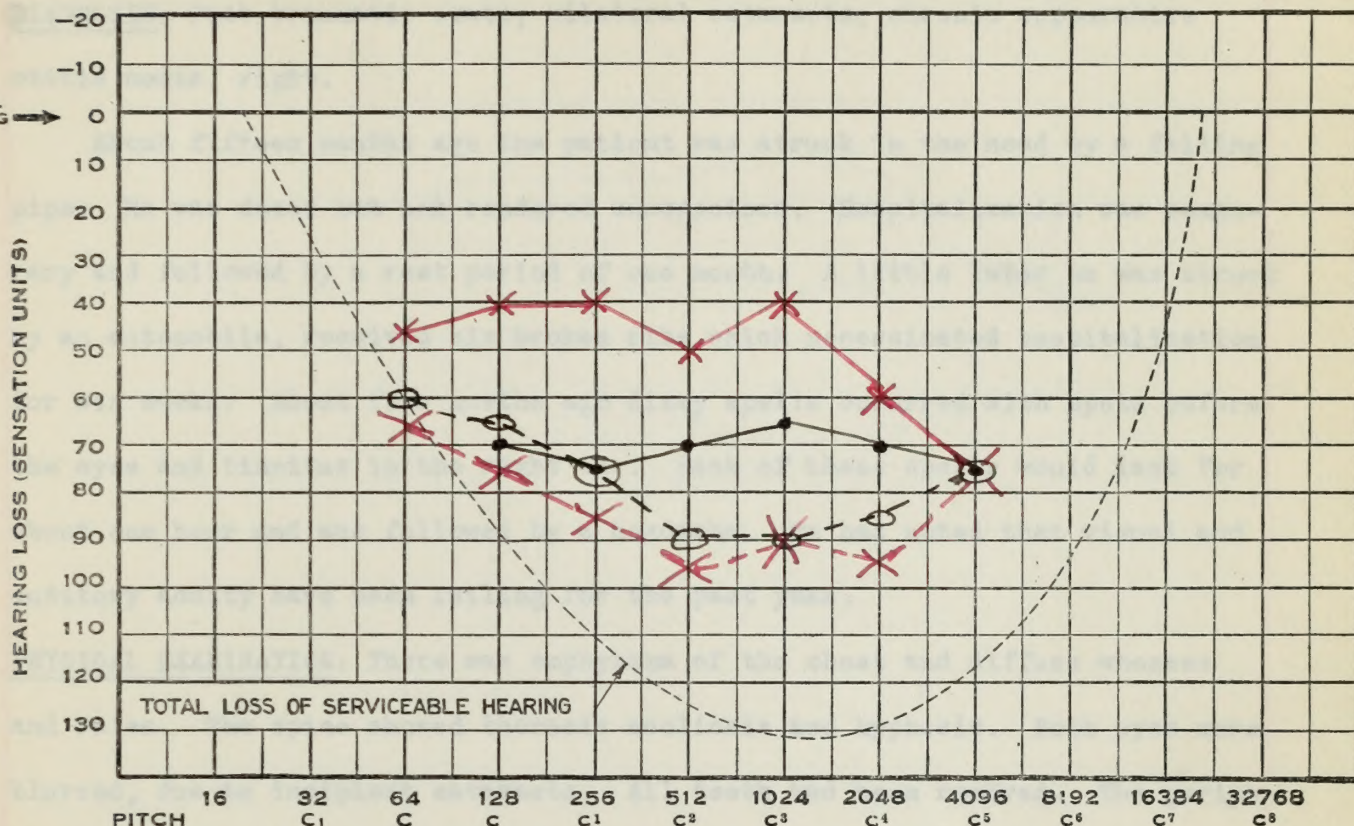
DIAGNOSIS: Laceration of the brain; bilateral nerve deafness.

Five days ago the patient fell from a wagon and struck the back of his head. He states that he has been unable to hear since then although friends say that there had been a hearing difficulty for some time previous to the accident. He was unconscious for a period of some 12 hours.

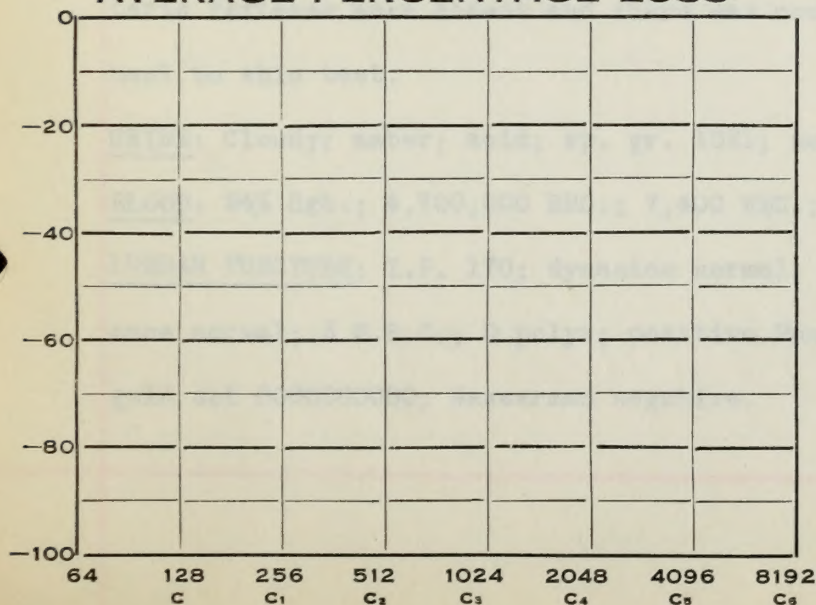
PHYSICAL EXAMINATION: The patient is a well developed and well nourished man in no apparent distress. The only positive findings were an old deformity of the nose, and contused area over the spine.

NEUROLOGICAL EXAMINATION: The patient is now mentally clear and well oriented although the examination is difficult because of his extreme deafness. He recalls nothing following the accident until he awoke twelve hours later at the relief station. Complete neurological examination reveals only involvement of the eighth nerve. The hearing is so much impaired that conversation is almost impossible. There is a horizontal nystagmus which is more marked on looking to the left. All reflexes are normal with the exception of the ankle jerk which was not obtained on the left. X-rays of the skull show no evidence of a fracture.

BLOOD: 85% Hb.; 4,410,000 RBC; 8,400 WBC; pr. 130/70; Kahn negative.
URINE: Amber; acid; sp. gr. 1.020; no albumen but trace of sugar.
SPERMATOCYTOGENESIS: 25 W.B.C.; 600 poly; 4,000 R.B.C.
SPERMATOCYTOGENESIS: I.P. 55; dynamics not checked; 8 cc. removed; 2 P. 55; sp-

EVANS MEMORIAL**AUDIOGRAM**NAME J. P. C. 746254
DATE..... 19.....

Weber Left 4 Points.

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

Right..... Left.....

Rinne $\frac{AC}{BC}$

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

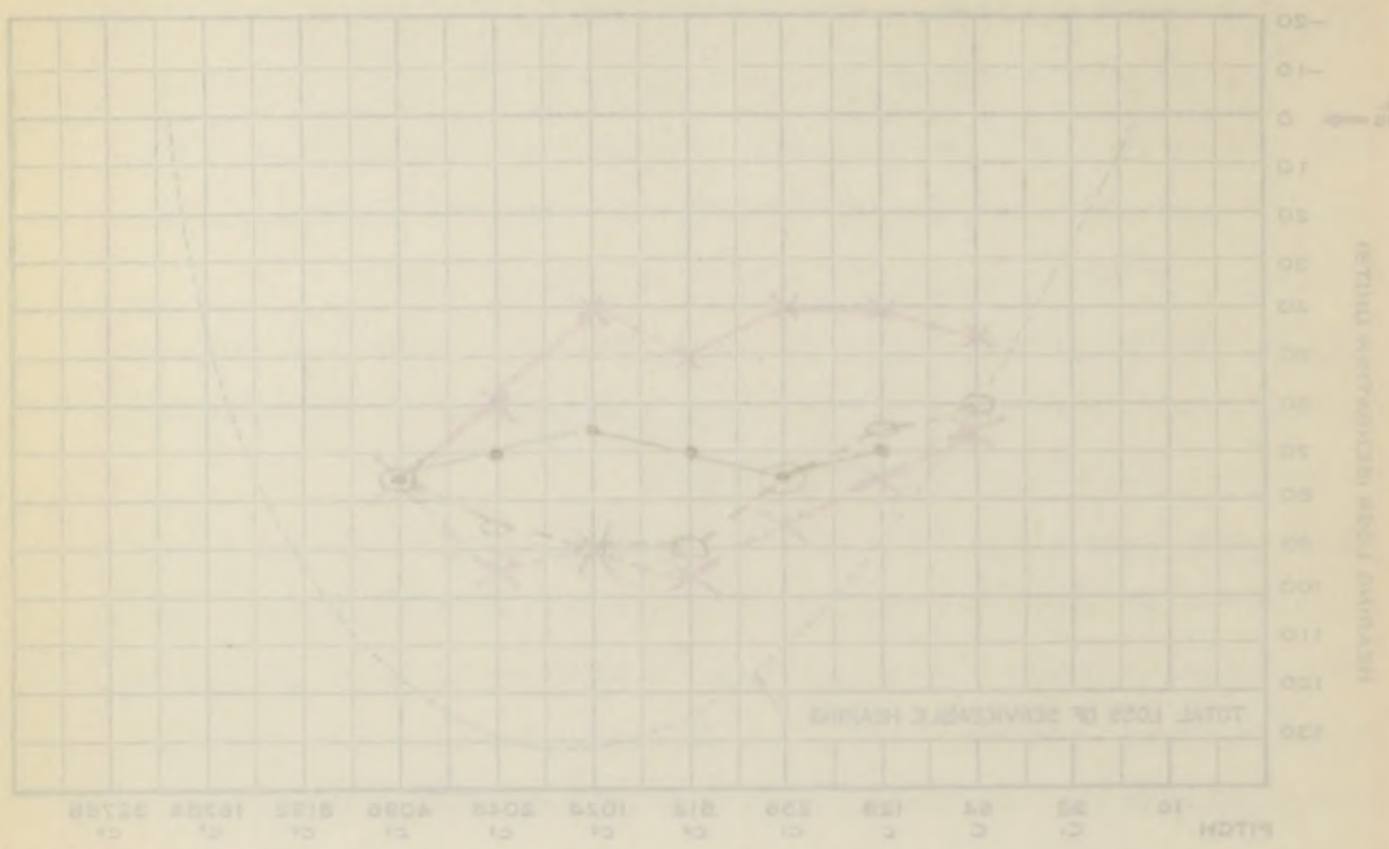
EVANS MEMORIAL

AUDIOGRAM

NAME J.P.C.

DATE

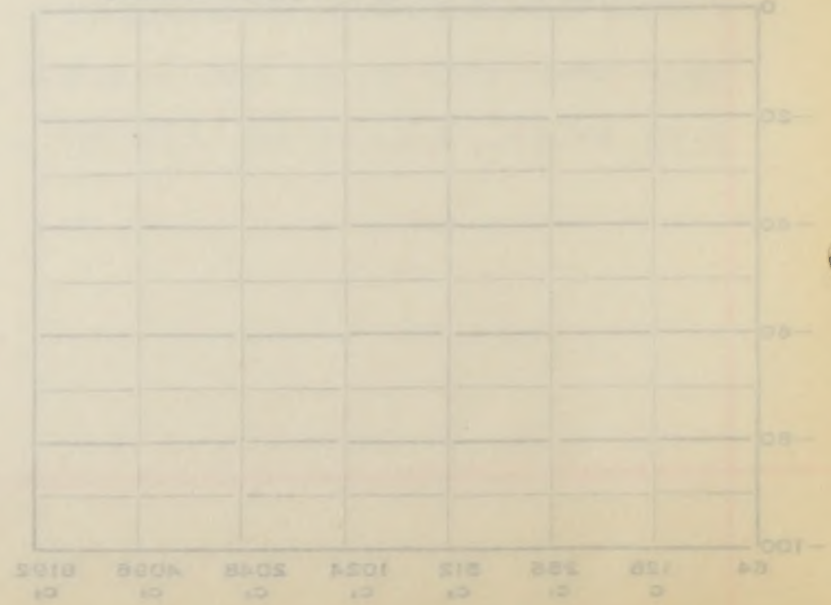
746254



Right Ear
Left Ear
Average Percentage Loss

Weber Left 4 Points.

AVERAGE PERCENTAGE LOSS



Diagnosis
Duration
List of symptoms
1. Tinnitus
2. Deafness
3. Deafness
4. Tinnitus
5. Deafness
6. Deafness
Right
Left
Upper limit
Lower limit
Whisper
Voice

J... P... C...; #746,254; Male; Age 65; White; Widower.

DIAGNOSIS: Post-traumatic state; bilateral cataracts; chronic suppurative otitis media, right.

About fifteen months ago the patient was struck in the head by a falling pipe. He was dazed but not rendered unconscious. Hospitalization was temporary and followed by a rest period of one month. A little later he was struck by an automobile, received six broken ribs which necessitated hospitalization for six weeks. About five months ago dizzy spells occurred with spots before the eyes and tinnitus in the right ear. Each of these spells would last for about one hour and was followed by a headache. He has noted that visual and auditory acuity have been failing for the past year.

PHYSICAL EXAMINATION: There was emphysema of the chest and diffuse wheezes and rales. The spine showed thoracic scoliosis and kyphosis. Both eyes were blurred, due to incipient cataracts. All teeth had been removed. The peripheral vessels showed a general tortuosity and were firm to percussion.

NEUROLOGICAL EXAMINATION: The optic fundi could not be examined, due to the cataracts but a few nystagmoid jerks were present on lateral deviation. There was fine rhythmic tremor of the hands and a monotonous, propulsive gait to the right. The right face seemed to move better than the left. The cremasteric reflexes were absent and there was considerable incoordination in the heel to shin test.

URINE: Cloudy; amber; acid; sp. gr. 1021; no sugar nor albumen.

BLOOD: 94% Hgb.; 4,700,000 RBC.; 7,400 WBC.; Kahn negative; pressure 155/100.

LUMBAR PUNCTURE: I.P. 170; dynamics normal; 15 cc. removed; F.P. 80; appearance normal; 3 W.B.C.; 0 polys; positive Pandy; protein 26 mg/100 cc.; gold sol 0000000000; Wasserman negative.

J... P... 5...; 4746, 284; Male; Age 65; White; Widower.

DIAGNOSIS: Post-traumatic stress; bilateral cataracts; chronic suppurative

otitis media, right.

About fifteen months ago the patient was struck in the head by a falling pipe. He was dazed but not rendered unconscious. Hospitalization was temporary and followed by a rest period of one month. A little later he was struck by an automobile, received six broken ribs which necessitated hospitalization for six weeks. About five months ago distal spalls occurred with spots before the eyes and clonus in the right ear. Each of these spalls would last for about one hour and was followed by a headache. He has noted that visual and auditory acuity have been falling for the past year.

PHYSICAL EXAMINATION: There was tachypnea of the chest and diffuse wheezes and rales. The spine showed thoracic scoliosis and kyphosis. Both eyes were distorted, due to incipient cataracts. All teeth had been removed. The peripheral vessels showed a general tortuosity and were firm to palpation.

NEUROLOGICAL EXAMINATION: The optic fundi could not be examined, due to the cataracts but a few nystagmoid jerks were present on lateral deviation. There was fine rhythmic tremor of the hands and a non-tender, progressive pain to the right. The right foot seemed to move better than the left. The cremasteric reflexes were absent and there was considerable incoordination in the heel to shin test.

URINE: Cloudy; amber; acid; sp. gr. 1.021; no sugar nor albumen.

BLOOD: Hgb.: 4,700,000 RBC.; 7,400 WBC.; Kahn negative; pressure 155/100.

LUMBAR PUNCTURE: I.P. 170; dynamics normal; 15 cc. removed; R.P. 60; spores-

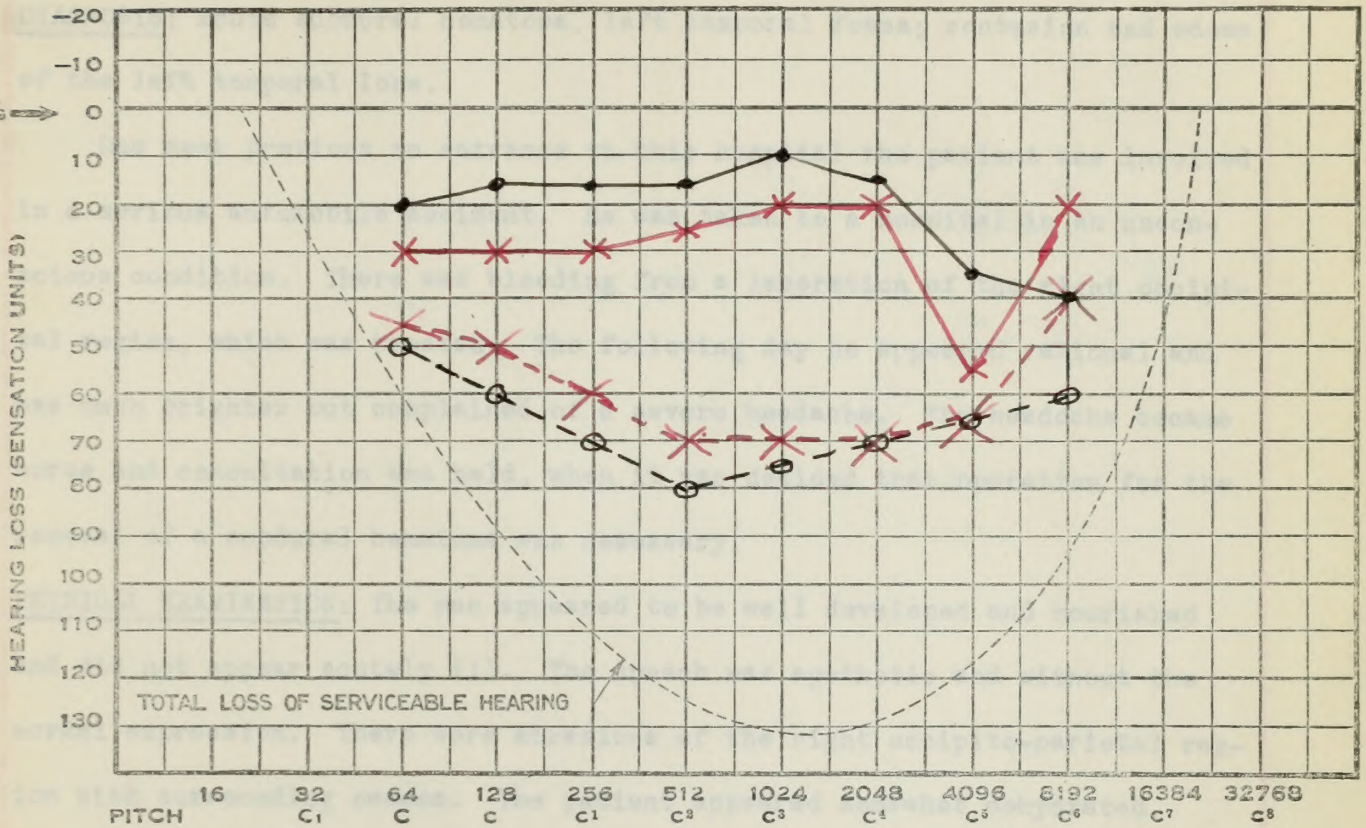
none normal; 3 W.B.C.; 0 polys; positive Pandey; protein 28 mg/100 cc.;

Gold sol 000000000; Wasserman negative.

EVANS MEMORIAL

AUDIOGRAM

NAME E. M. 705124
DATE 19.....



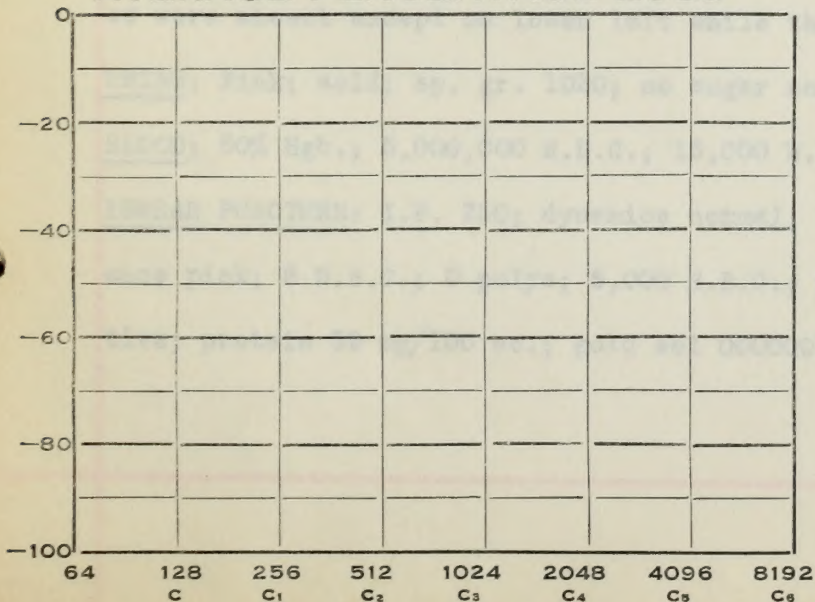
Percentage Hearing Loss

Right Ear

Left Ear

Weber = at 4 Points.

AVERAGE PERCENTAGE LOSS



Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right

Left

Rinne $\frac{AC}{BC}$

Weber

Upper Limit

Lower Limit

Whisper

Voice

E... M...; #705,124; Male; Age 26; White; Single.

DIAGNOSIS: Acute subdural hematoma, left temporal fossa; contusion and edema of the left temporal lobe.

One week previous to entrance to this hospital the patient was involved in a serious automobile accident. He was taken to a hospital in an unconscious condition. There was bleeding from a laceration of the right occipital region, which was treated. The following day he appeared rational and was much brighter but complained of a severe headache. The headache became worse and consultation was held, when it was decided that operation for the removal of a subdural hematoma was necessary.

PHYSICAL EXAMINATION: The man appeared to be well developed and nourished and did not appear acutely ill. The speech was apathetic and without the normal expression. There were abrasions of the right occipito-parietal region with surrounding oedema. The patient appeared somewhat dehydrated.

NEUROLOGICAL EXAMINATION: The optic fundi showed hyperemic discs with obscure margins, tortuosity of the veins and absence of the normal cupping. The retinae appeared somewhat edematous. There was a slight, right facial weakness to both emotional and volitional stimulation while the naso-labial fold was less marked on the right. Neck was quite stiff to flexion. Abdominal reflexes were absent except on lower left while the right cremasteric was absent.

URINE: Pink; acid; sp. gr. 1020; no sugar nor albumen.

BLOOD: 80% Hgb.; 5,000,000 R.B.C.; 13,000 W.B.C.; Kahn negative; pr. 110/70.

LUMBAR PUNCTURE: I.P. 250; dynamics normal; 10 cc. removed; F.P. 120; appearance pink; 8 W.B.C.; 0 polys; 5,000 R.B.C.; Ross-Jones negative; Pandy positive; protein 39 mg/100 cc.; gold sol 0000000000; Wasserman negative.

S... 1908, 12; Age 20; Single.

DIAGNOSIS: Acute subdural hematoma, left temporal fossa; contusion and edema

of the left temporal lobe.

One week previous to entrance to this hospital the patient was involved

in a serious automobile accident. He was taken to a hospital in an uncon-

scious condition. There was bleeding from a laceration of the right occipital

scal region, which was treated. The following day he appeared rational and

was much brighter but complained of a severe headache. The headache became

worse and consultation was held, when it was decided that operation for the

removal of a subdural hematoma was necessary.

PHYSICAL EXAMINATION: The man appeared to be well developed and nourished

and did not appear acutely ill. The speech was apathetic and without the

normal expression. There were abrasions of the right occipital-parietal reg-

ion with surrounding edema. The patient appeared somewhat dehydrated.

NEUROLOGICAL EXAMINATION: The optic fundi showed hyperemic discs with obscure

arteries, tortuosity of the veins and absence of the normal cupping. The ret-

inae appeared somewhat edematous. There was a slight, right facial weakness

to both emotional and volitional stimulation while the nose-labial fold was

less marked on the right. Neck was quite stiff to flexion. Abdominal reflex-

es were absent except on lower left while the right cremasteric was present.

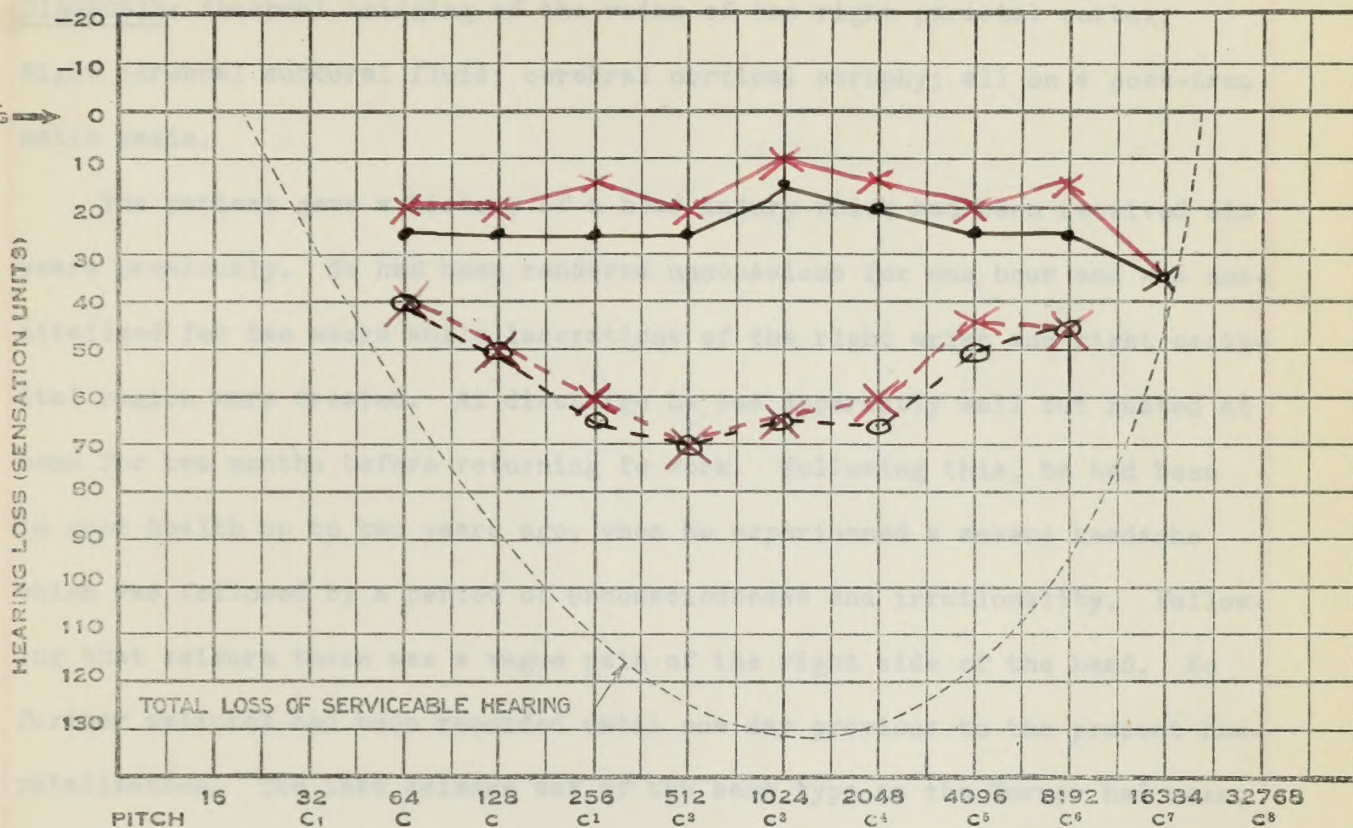
URINE: Pink; acid; sp. gr. 1.020; no sugar; not albumen.

BLOOD: Hgb. 5,000,000 R.B.C.; 15,000 W.B.C.; Kahn negative; pr. 110/70.

LUMBAR PUNCTURE: I.P. 250; typhoid normal; in co. removed; P.P. 120; appear-

ance pink; S.W.B.C.; 6 poly; 6,000 R.B.C.; Ross-Jones negative; Bandy posi-

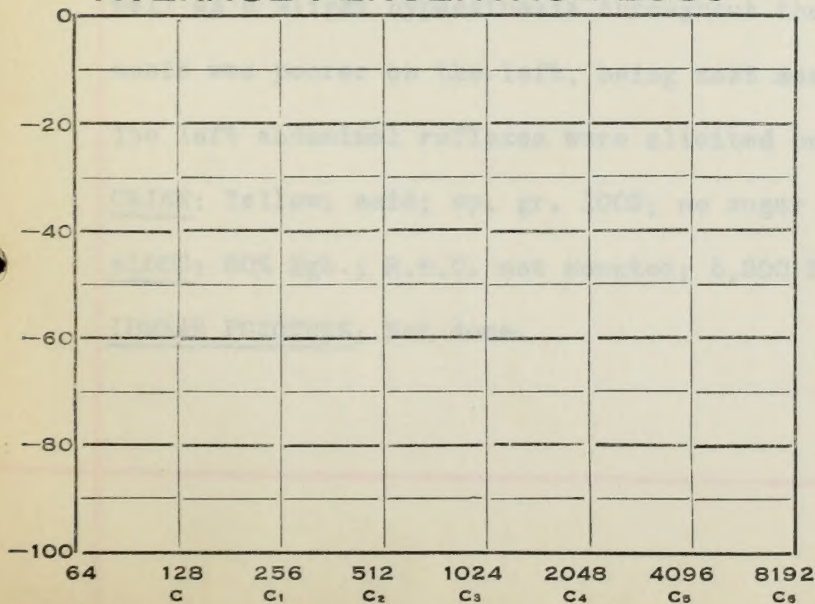
tive; protein 32 mg/100 cc.; gold and 000000000; Wassermann negative.

EVANS MEMORIAL**AUDIOGRAM**NAME C.F.B. 704701
DATE 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

..... Rinne ^{AC} _{BC}

..... Weber

..... Upper Limit.....

..... Lower Limit.....

..... Whisper.....

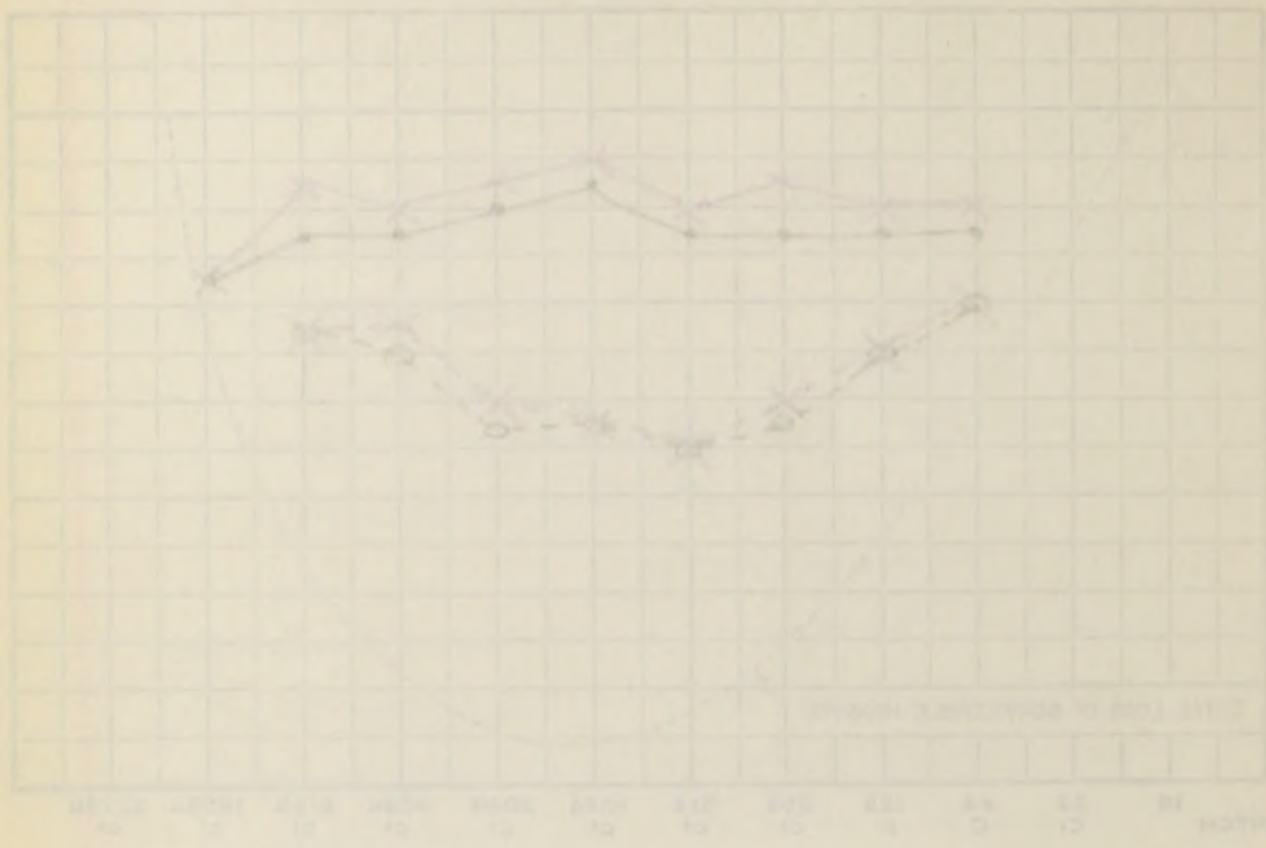
..... Voice.....

EVANS MEMORIAL

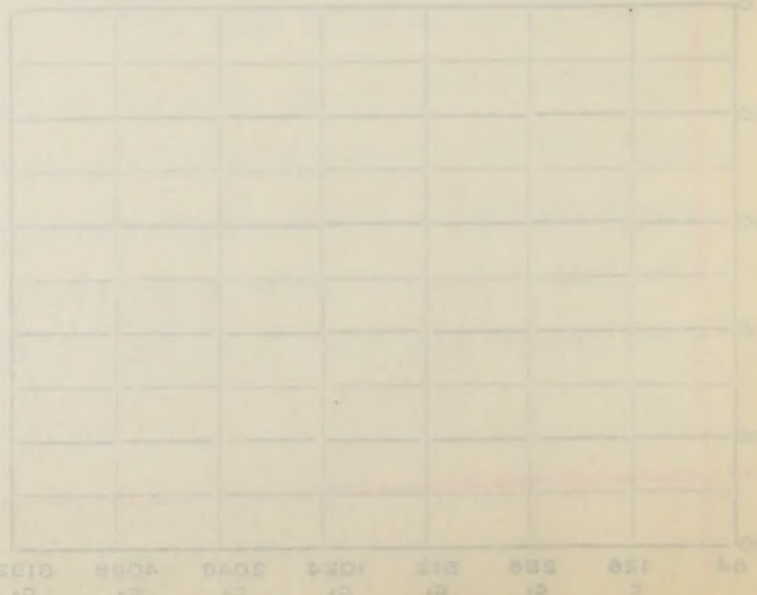
204701

C.F.B.

AUDIOGRAM



AVERAGE PERCENTAGE LOSS



Examiner: _____
Date: _____
Patient: _____
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99. Test: _____
100. Test: _____

C... F... B...; #704,701; Male; Age 31; White; Married.

DIAGNOSIS: Abnormal bridging of the veins of the right parietal cortex; Right cerebral subdural fluid; cerebral cortical atrophy; all on a post-traumatic basis.

The patient gave a history of a head injury which had been received six years previously. He had been rendered unconscious for one hour and was hospitalized for two weeks while lacerations of the right wrist and right occipital region were treated. At discharge he was apparently well but rested at home for two months before returning to work. Following this, he had been in good health up to two years ago, when he experienced a severe headache which was followed by a period of unconsciousness and irrationality. Following that seizure there was a vague pain of the right side of the head. No further seizures had been recorded until one day previous to the present hospitalization. The last seizure was of the same type as the former had been.

PHYSICAL EXAMINATION: The man appeared essentially normal with the exception of a depression of the skull which appeared to cause pressure of the right post Rolandic area.

NEUROLOGICAL EXAMINATION: There was tenderness to pressure or percussion over the right parietal region and hypaesthesia of the left trigeminal nerve, as well as a slight hypaesthesia throughout the left side of the body. Topognosis was poorer on the left, being most marked in the upper extremities. The left abdominal reflexes were elicited only with difficulty.

URINE: Yellow; acid; sp. gr. 1005; no sugar nor albumen.

BLOOD: 80% Hgb.; R.B.C. not counted; 5,800 W.B.C.; Kahn negative; pr. 130/80.

LUMBAR PUNCTURE: Not done.

B... F... B...; 5'04, 101; hair; age 31; white; married.

DIAGNOSIS: Abnormal bridging of the veins of the right cerebral cortex;
right cerebral subdural fluid; cerebral cortical atrophy; all on a post-trau-
matic basis.

The patient gave a history of a head injury which had been received six
years previously. He had been rendered unconscious for one hour and was hos-
pitalized for two weeks while lacerations of the right wrist and right olecra-
nial region were treated. At discharge he was apparently well but noted at
home for two months before returning to work. Following this, he had been
in good health up to two years ago, when he experienced a severe headache
which was followed by a period of unconsciousness and irrationality. Follow-
ing that seizure there was a vague pain of the right side of the head. No
further seizures had been recorded until one day previous to the present hos-
pitalization. The last seizure was of the same type as the former had been.
PHYSICAL EXAMINATION: The man appeared essentially normal with the exception
of a depression of the skull which appeared to cause pressure of the right

post Rolandic area.

NEUROLOGICAL EXAMINATION: There was tenderness to pressure or percussion over
the right parietal region and hypaesthesia of the left trigeminal nerve, as
well as a slight hypaesthesia throughout the left side of the body. Topog-
nosis was poorer on the left, being most marked in the upper extremities.
The left abdominal reflexes were elicited only with difficulty.

URINE: Yellow; acid; sp. gr. 1.008; no sugar nor albumen.

BLOOD: Hgb.: 80; R.B.C. not counted; 5,000 W.B.C.; Kahn negative; ur. 130/80.

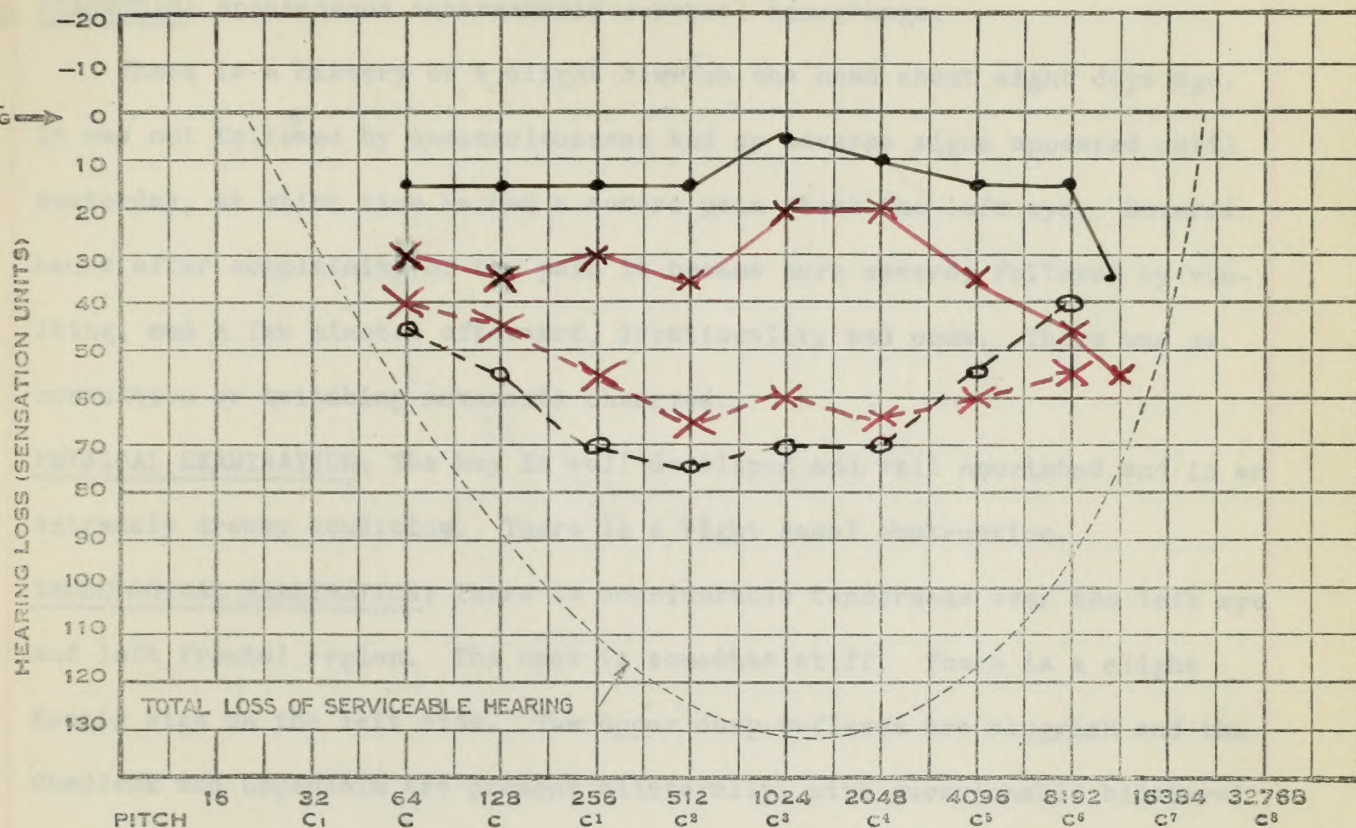
LUMBAR PUNCTURE: Not done.

EVANS MEMORIAL

AUDIOGRAM

NAME G. M. H. 698977

DATE..... 19.....

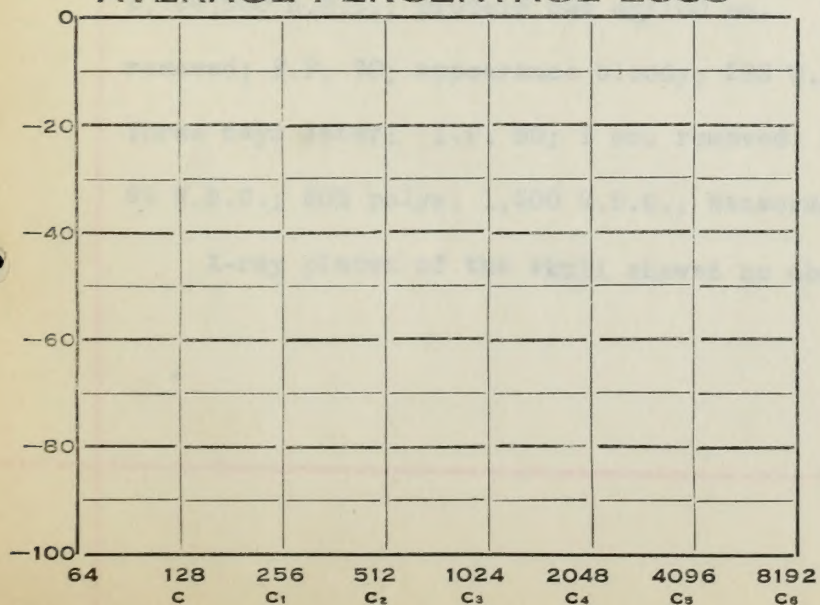


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Disease

Duration

Chief Symptom.....

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right

Left

..... Rinne AC

..... Weber BC

..... Upper Limit.....

..... Lower Limit.....

..... Whisper.....

..... Voice.....

EVANS MEMORIAL

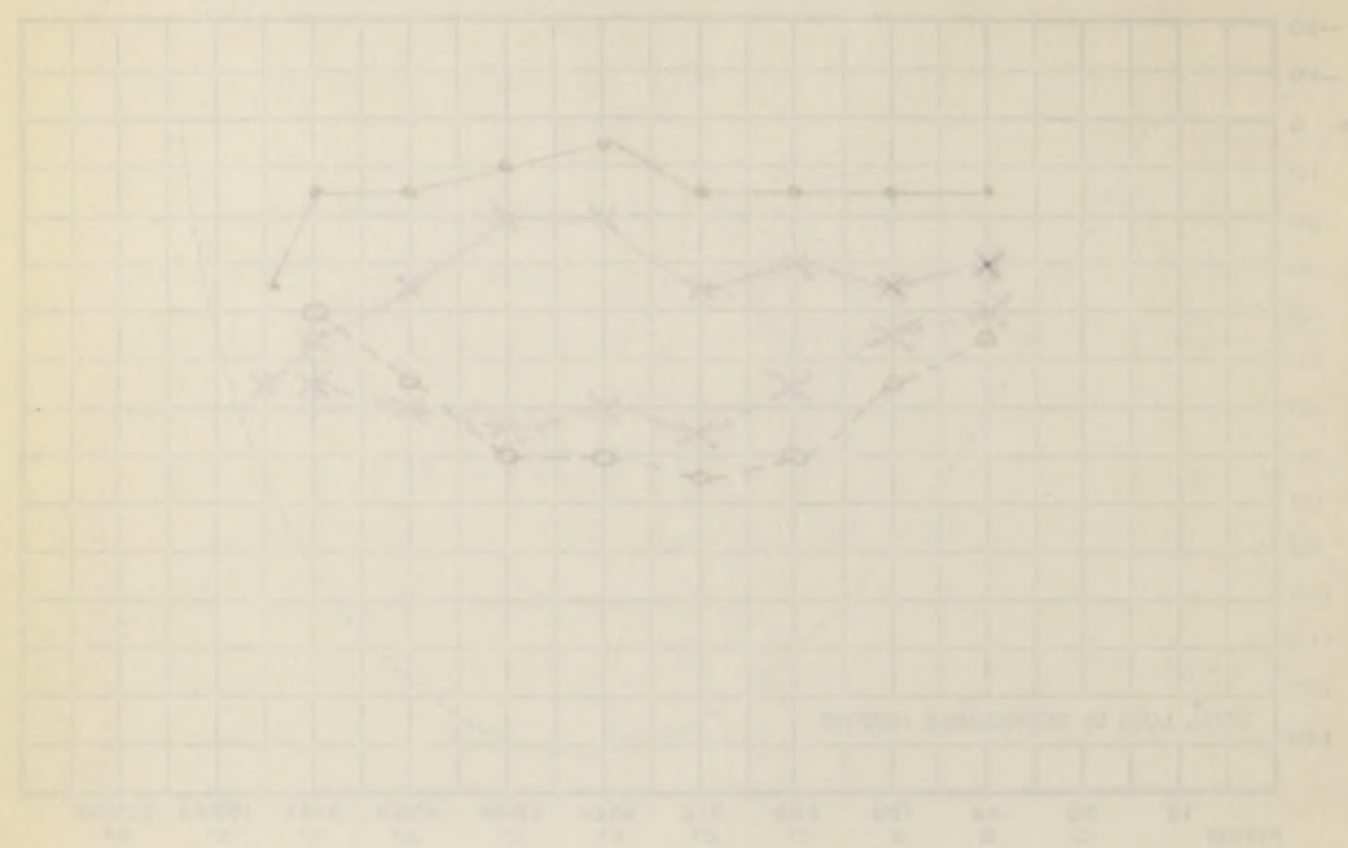
62827

G.M.H.

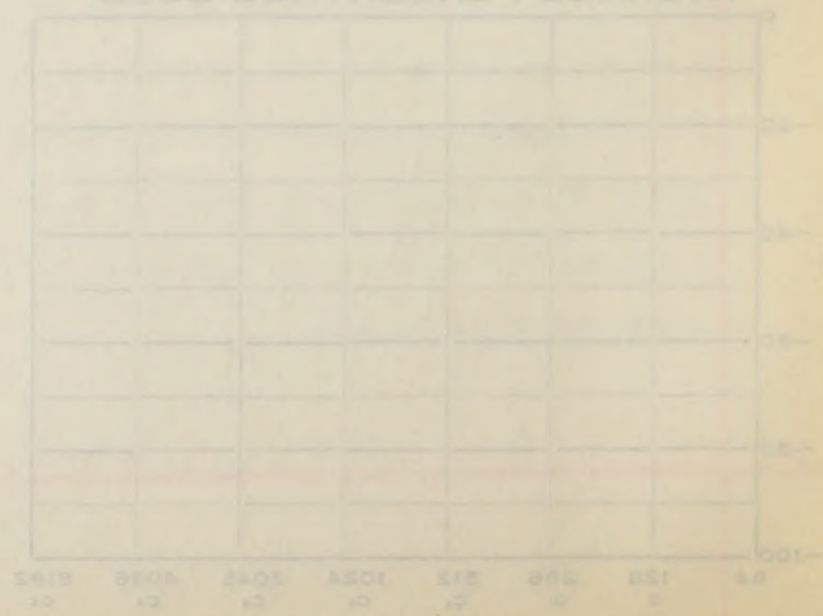
NAME

DATE

AUDIOGRAM



AVERAGE PERCENTAGE LOSS



G... H...; #698,977; Male; Age 17; White; Single.

DIAGNOSIS: Spontaneous subarachnoid cerebral hemorrhage.

There is a history of a slight blow on the head about eight days ago. It was not followed by unconsciousness and no adverse signs appeared until yesterday, at which time he had a severe pain about the left eye. Several hours after complaining of the pain it became more severe, followed by vomiting, and a few minutes afterward, irrationality and coma. There was no convulsion or twitching movements observed.

PHYSICAL EXAMINATION: The boy is well developed and well nourished and in an extremely drowsy condition. There is a right nasal obstruction.

NEUROLOGICAL EXAMINATION: There is considerable tenderness over the left eye and left frontal region. The neck is somewhat stiff. There is a slight Koenig sign on the left side. The upper deep reflexes are sluggish and the Chaddock and Oppenheim are present bilaterally, with questionable bilateral Babinskis.

URINE: Yellow; alkaline; sp. gr. 1020; no sugar nor albumen.

BLOOD: 90% Hgb.(S); red cells not counted; 9,500 W.B.C.; five days later 8,000 W.B.C.; Kahn negative.

LUMBAR PUNCTURE: I.P. 320; 15 cc. removed; F.P. 120; appearance bloody; 3,700,000 R.B.C.; protein 534 mg/100 cc. Two days later: I.P. 80; 1 cc. removed; F.P. 70; appearance bloody; 288 W.B.C.; 70% polys; 56,800 R.B.C. Three days later: I.P. 90; 1 cc. removed; F.P. 75; appearance brownish; 69 W.B.C.; 80% polys; 1,300 R.B.C.; Wasserman negative.

X-ray plates of the skull showed no abnormalities.

G... H...: 6025, 977; Males; Age 17; White; Single.

DIAGNOSIS: Spontaneous subarachnoid cerebral hemorrhage.

There is a history of a slight blow on the head about eight days ago. It was not followed by unconsciousness and no adverse signs appeared until yesterday, at which time he had a severe pain about the left eye. Several hours after complaining of the pain it became more severe, followed by vomiting, and a few minutes afterward, irritability and coma. There was no convulsion or twitching movements observed.

PHYSICAL EXAMINATION: The boy is well developed and well nourished and in an extremely drowsy condition. There is a right nasal obstruction.

OPHTHALMOLOGICAL EXAMINATION: There is considerable lid-lag over the left eye and left frontal region. The neck is somewhat stiff. There is a slight frontal sign on the left side. The upper deep reflexes are elicited and the Chaddock and Oppenheim are present bilaterally, with questionable bilateral Babinski.

URINE: Yellow; alkaline; sp. gr. 1020; no sugar nor albumen.

BLOOD: 502 R.B.C.; red cells not counted; 5,500 W.B.C.; five days later 5,000 W.B.C.; Kahn negative.

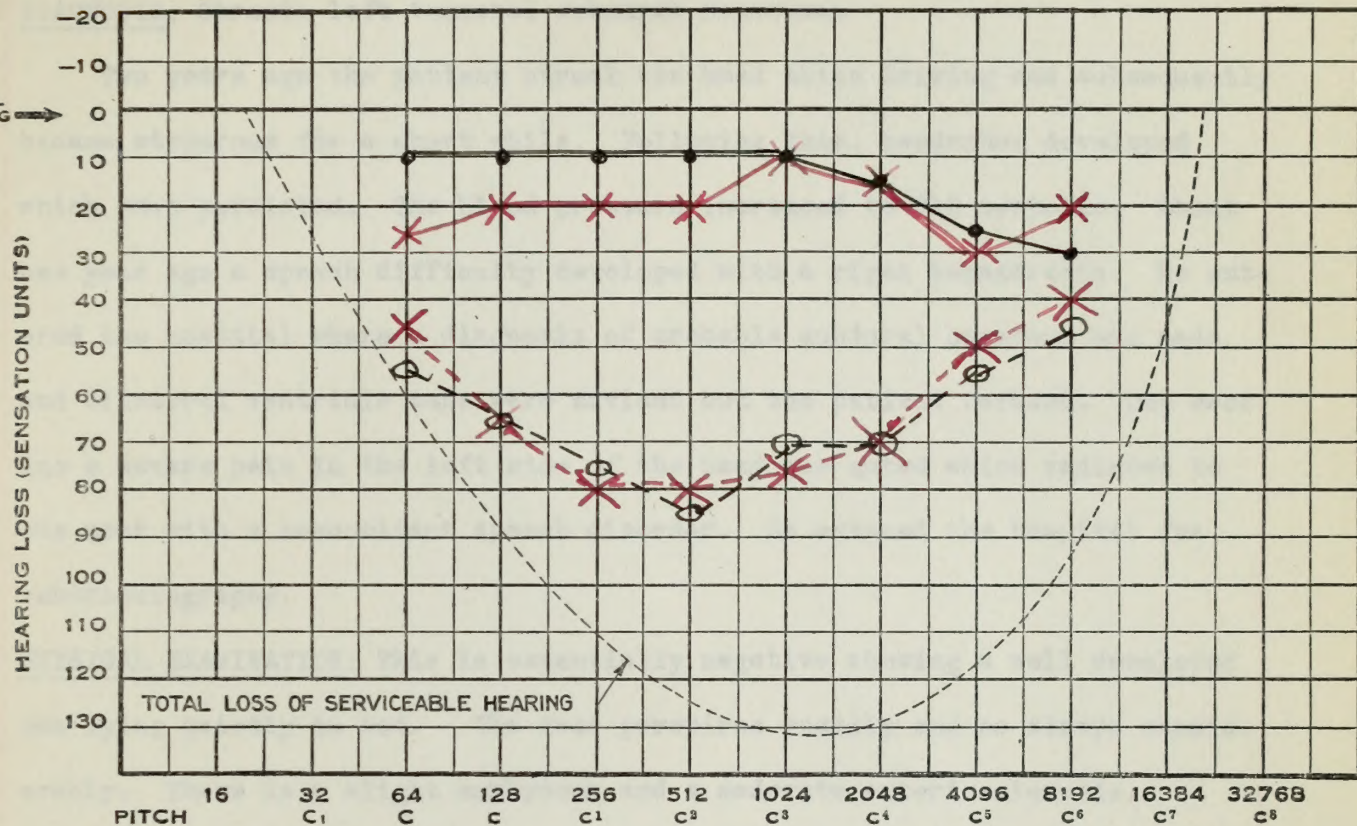
HEPATIC FUNCTION: I.P. 320; 15 cc. removed; R.P. 120; appearance bloody; 3,700,000 R.B.C.; protein 334 mg/100 cc. Two days later: I.P. 80; 1 cc. removed; R.P. 70; appearance bloody; 288 W.B.C.; 704 cells; 68,300 R.B.C. Three days later: I.P. 80; 1 cc. removed; R.P. 70; appearance brownish; 88 W.B.C.; 804 cells; 1,300 E.B.C.; Wasserman negative.

X-ray plates of the skull showed no abnormalities.

EVANS MEMORIAL

AUDIOGRAM

NAME H. L. 701 444
DATE _____ 19__

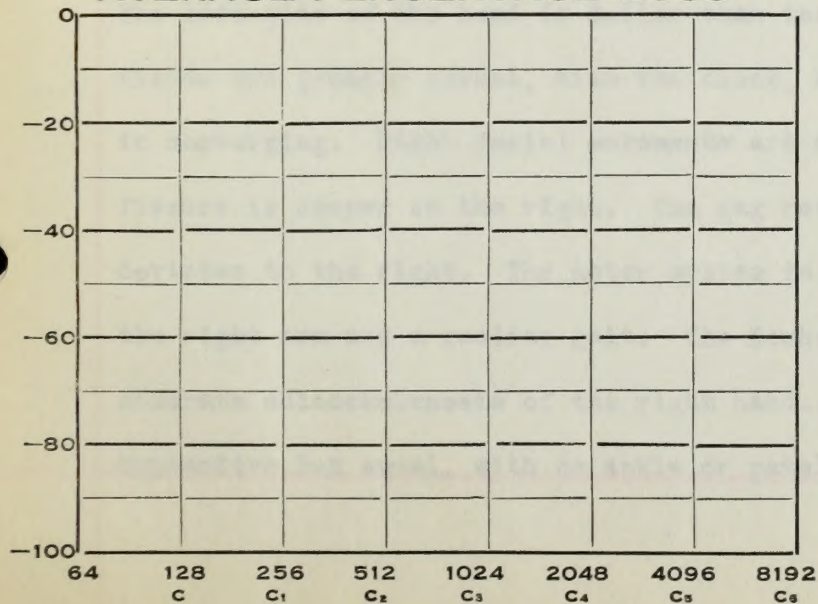


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain
3. Discharge.....
4. Tinnitus
5. Headache
6. Dizziness

Right

Left

..... Rinne ^{AC}_{BC}

..... Weber

..... Upper Limit.....

..... Lower Limit.....

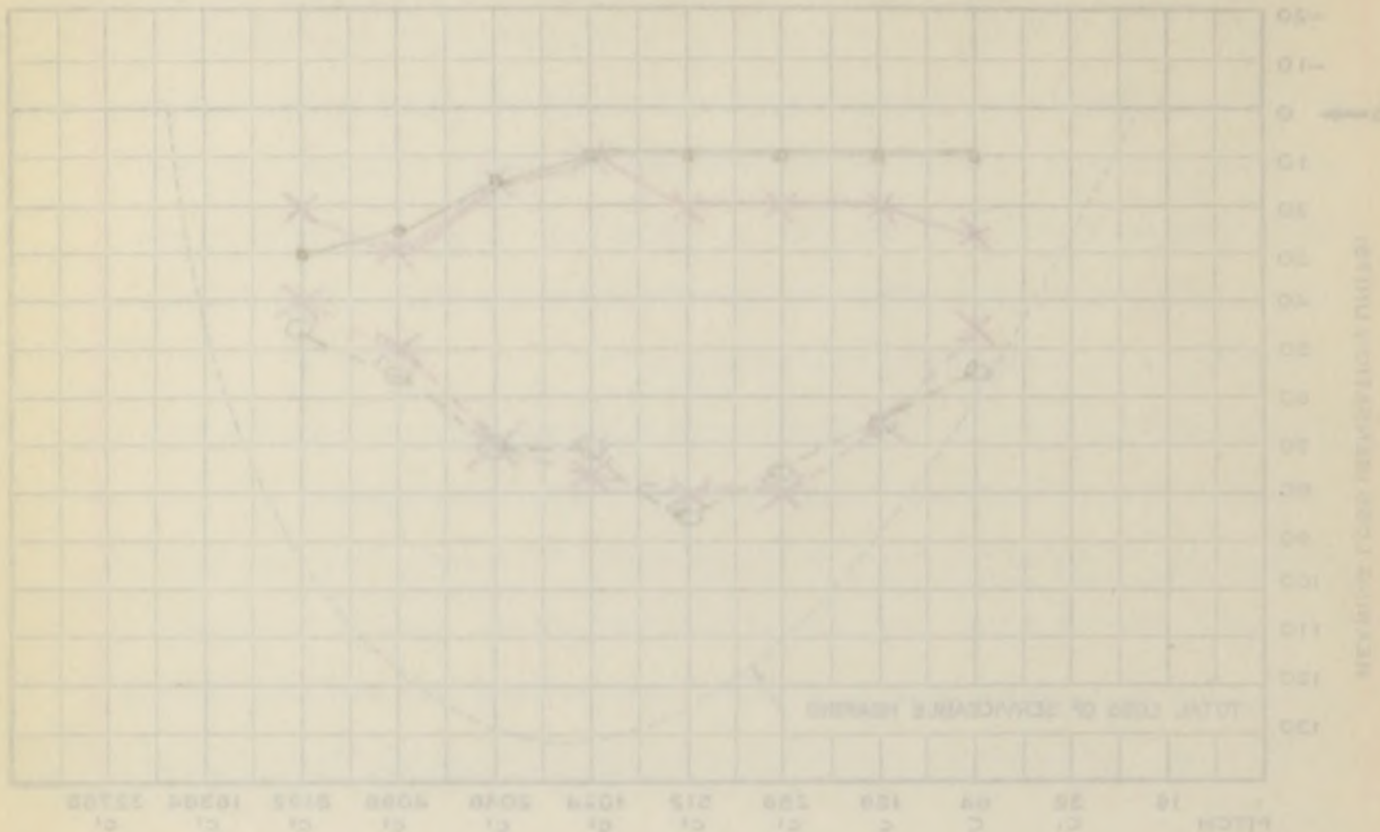
..... Whisper.....

..... Voice.....

EVANS MEMORIAL

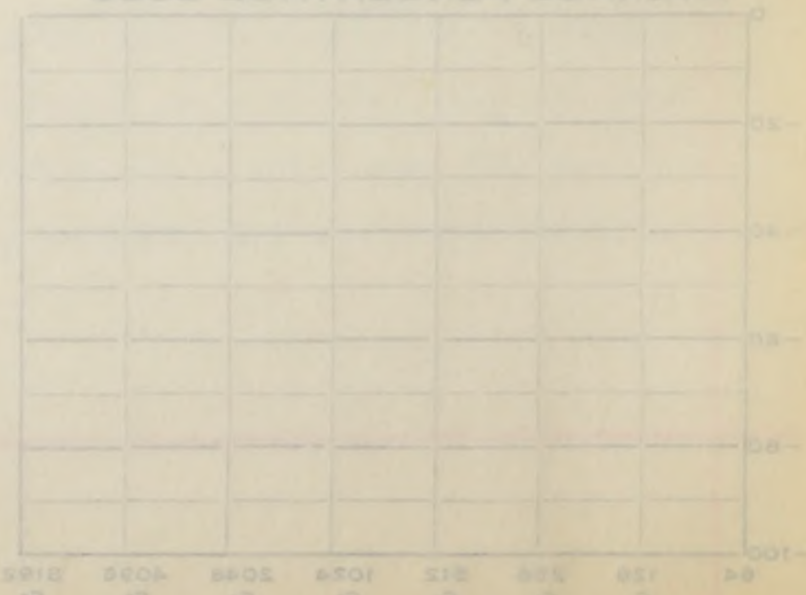
AUDIOGRAM

NAME H.A.
DATE 10/14/44



Frequency Hearing Loss
Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Diagnosis
Disease
Cause
Clinical Syndrome
1. Deafness
2. Deafness
3. Deafness
4. Deafness
5. Deafness
6. Deafness
7. Deafness
8. Deafness
9. Deafness
10. Deafness
11. Deafness
12. Deafness
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97. Deafness
98. Deafness
99. Deafness
100. Deafness

H...L...; #701,444; Male; Age 56; White; Married.

DIAGNOSIS: Chronic left temporal subdural hematoma.

Two years ago the patient struck his head while driving and subsequently became stuporous for a short while. Following this, headaches developed which have persisted. The blood pressure increased to 210 systolic. About one year ago a speech difficulty developed with a right hemiparesis. He entered the hospital where a diagnosis of probable subdural hematoma was made and bilateral ventricle taps were advised but the patient refused. One week ago a severe pain in the left side of the head was noted which radiated to the neck with a concomitant speech disorder. He entered the hospital for ventriculography.

PHYSICAL EXAMINATION: This is essentially negative showing a well developed man lying quietly in bed. The face perspires readily and he sleeps considerably. There is a slight emphysema and a moderate arteriosclerosis.

NEUROLOGICAL EXAMINATION: The patient is dull and apathetic but tries to cooperate. He is very poorly oriented for both present and past events and there is a tendency to fabricate. He talks fairly easily but becomes confused in sentence formation and the exact word to be used. There is a tendency to mix the movements of the right and left hand in mimicing the examiner. The left side of the head is duller than the right to percussion. The visual fields are grossly normal, also the discs, but there is a slight difficulty in converging. Right facial movements are somewhat limited and the palpebral fissure is deeper on the right. The gag reflex is absent, while the tongue deviates to the right. The motor system is generally weak with a paresis of the right arm and a reeling gait. The Romberg is positive and there is a moderate adiadokokinesis of the right hand. The reflexes are generally hypoactive but equal, with no ankle or patellar clonus. Both pupils react

M...L...; 4701,444; Wife; Age 58; White; Married.

DIAGNOSIS: Chronic left temporal subdural hematoma.

Two years ago the patient struck his head while driving and subsequently

became stuporous for a short while. Following this, headaches developed

which have persisted. The blood pressure increased to 210 systolic. About

one year ago a speech difficulty developed with a right homonymous. He ant-

ered the hospital where a diagnosis of probable subdural hematoma was made

and bilateral ventricle taps were advised but the patient refused. One week

ago a severe pain in the left side of the head was noted which radiated to

the neck with a concomitant speech disorder. He entered the hospital for

ventriculography.

PHYSICAL EXAMINATION: This is essentially negative showing a well developed

man lying quietly in bed. The face appears healthy and he appears consid-

erably. There is a slight emphysema and a moderate arteriosclerosis.

NEUROLOGICAL EXAMINATION: The patient is dull and apathetic but tries to co-

operate. He is very poorly oriented for both present and past events and

there is a tendency to fabricate. He talks fairly easily but becomes con-

sterned in sentence formation and the exact word to be used. There is a tend-

ency to mix the movements of the right and left hand in mimicking the examiner.

The left side of the head is duller than the right to percussion. The visual

fields are grossly normal, also the discs, but there is a slight difficulty

in converging. Right facial movements are somewhat limited and the palpebral

flasure is deeper on the right. The gag reflex is absent, while the tongue

deviates to the right. The motor system is generally weak with a paresis of

the right arm and a reeling gait. The Romberg is positive and there is a

moderate adiadochokinesis of the right hand. The reflexes are generally

hyporeactive but equal, with no ankle or patellar clonus. Both pupils react

sluggishly to light and accomodation.

LUMBAR PUNCTURE: I.P. 140; dynamics normal; 25 cc. removed; F.P. 80; appearance xanthochromic; chemistry not done.

URINE: Yellow; acid; sp. gr. 1025; no sugar nor albumen; sediment negative;

BLOOD: 60% Hgb.(T); 3,300,000 R.B.C.; 7,100 W.B.C.; secondary anemia, moderate; pressure 140/90.

At operation a clot was found over the left temporal region which was removed by suction. Laboratory examination of removed mass fixed diagnosis as subdural hematoma. Post operative course was rather stormy at first but subsequently progressed uneventfully. The aphasia had almost completely disappeared at time of discharge.

168

slightly to light and accommodation.

LABORATORY FINDINGS: I.R. 140; dynamics normal; SE cc. removed; F.P. 80; appear-

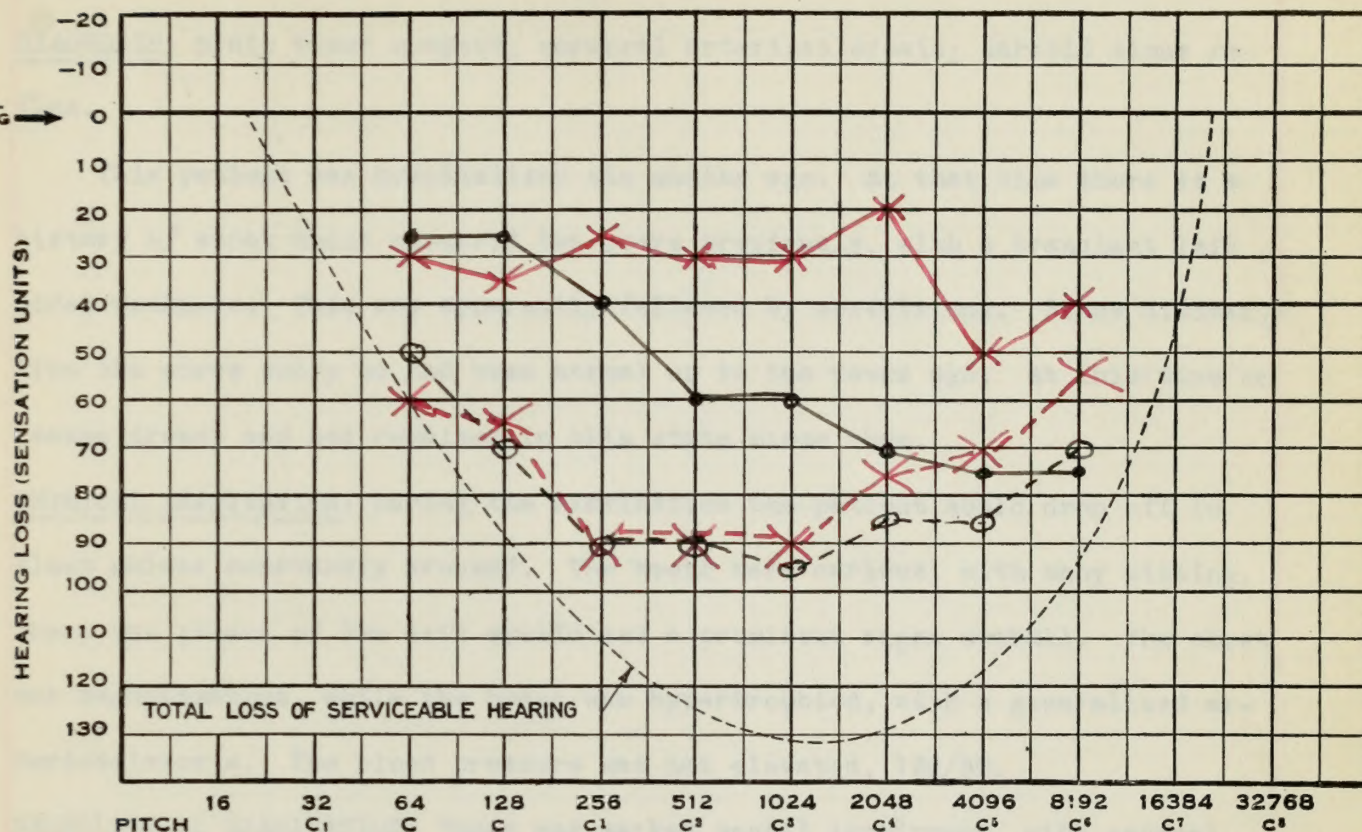
ance xanthochromic; chemistry not done.

URINE: Yellow; acid; sp. gr. 1.025; no sugar nor albumen; sediment negative;

BLOOD: 50% Hgb.(T); 3,800,000 R.B.C.; 7,100 W.B.C.; secondary anemia, mod-

erate; pressure 140/90.

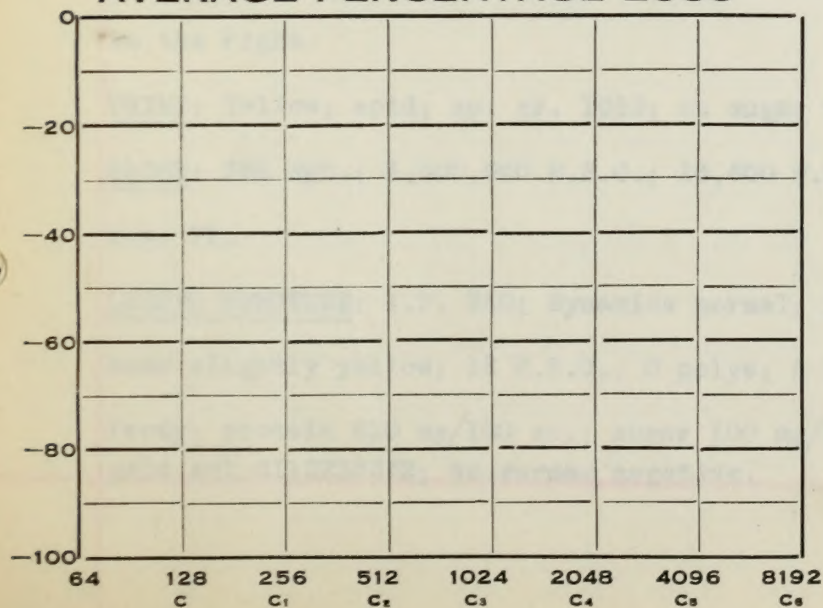
At operation a clot was found over the left temporal region which was removed by suction. Laboratory examination of removed mass fixed diagnosis as subdural hematoma. Post operative course was rather stormy at first but subsequently progressed uneventfully. The aphasia had almost completely disappeared at time of discharge.

EVANS MEMORIAL**AUDIOGRAM**NAME P.K. 730877
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness.....

2. Pain.....

3. Discharge.....

4. Tinnitus.....

5. Headache.....

6. Dizziness.....

RightLeftRinne AC
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

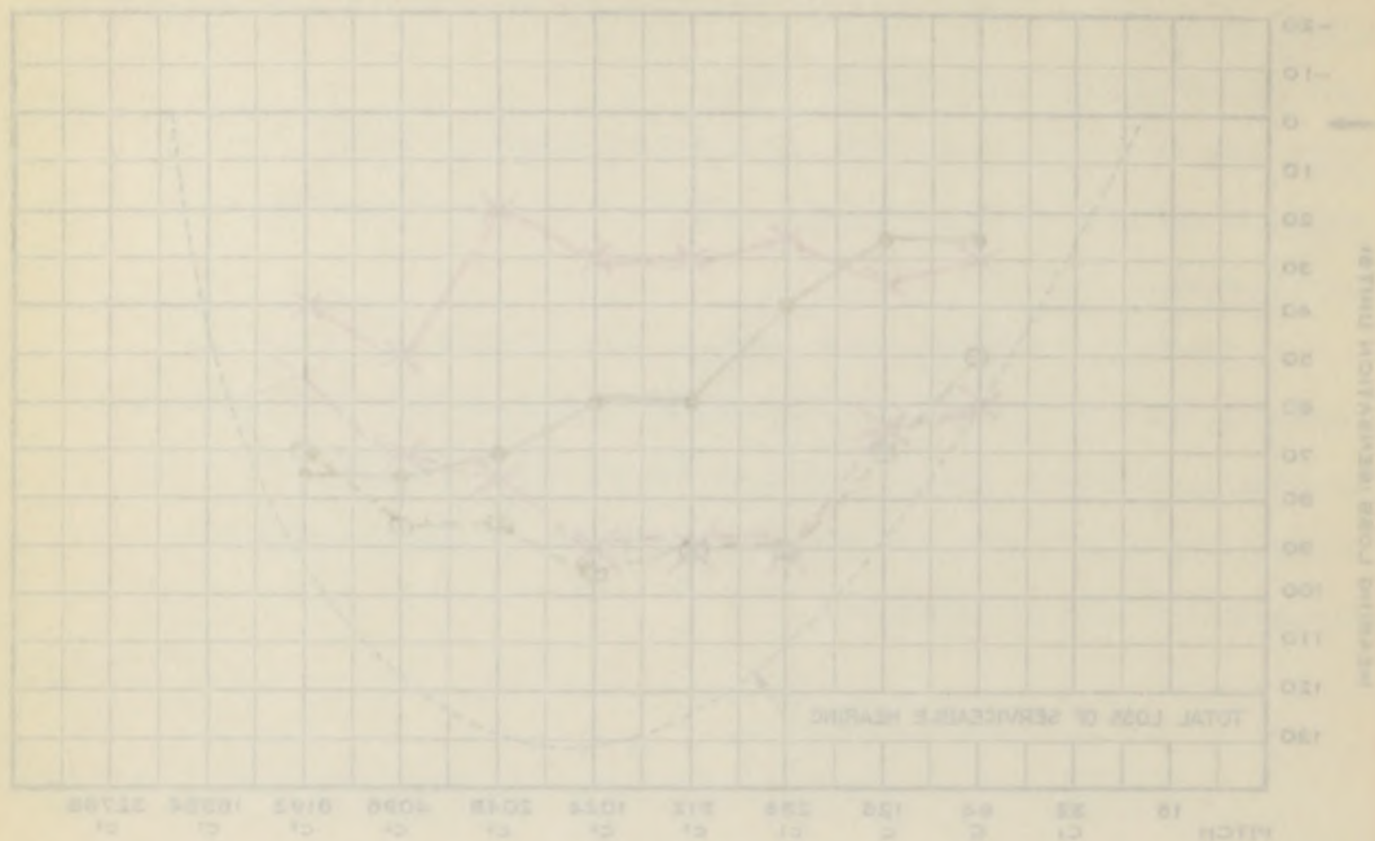
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

R.K.

730777

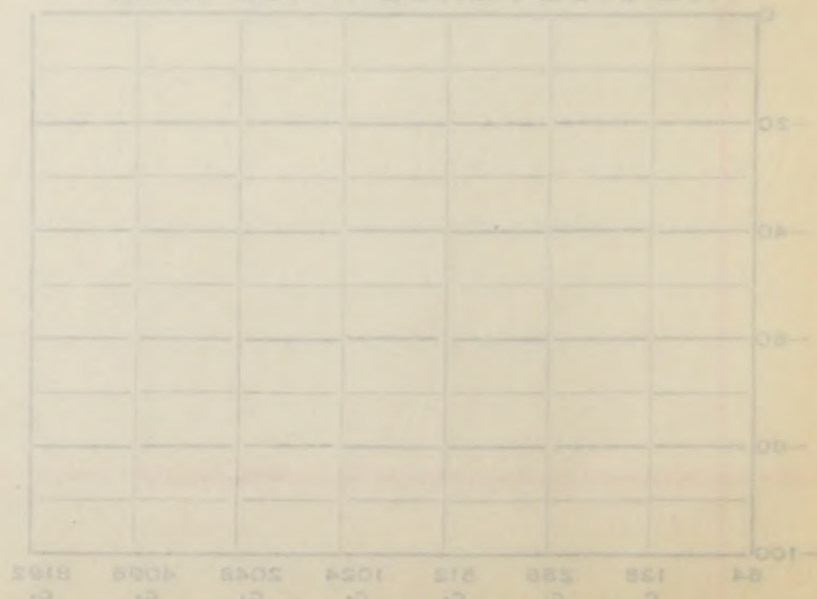


Frequency Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Diagnosis

Duration

Chief Complaint

1. Duration

2. Pain

3. Discharge

4. Itching

5. Headache

6. Dizziness

Right

Left

Rhinos

Wet

Upper Limit

Lower Limit

Whisper

Voice

P... K... ; #730,877; Male; Age 66; White; Widower.

DIAGNOSIS: Brain tumor suspect; cerebral arteriosclerosis; carotid sinus reflex.

This patient was hospitalized six months ago. At that time there is a history of shock which occurred two years previously, with a transient left sided weakness. This was apparently followed by convulsions. Since discharge from the above entry he had been normal up to two weeks ago. At this time he became drowsy and has remained in this state since then.

PHYSICAL EXAMINATION: During the examination the patient would drop off to sleep unless constantly aroused. The teeth were carious, with many missing. There was ptosis of the left eyelid and a prominent right eyeball. The chest was emphysematous, while the heart was hypertrophied, with a generalized arteriosclerosis. The blood pressure was not elevated, 138/80.

NEUROLOGICAL EXAMINATION: There was marked mental impairment, with general discrimination and impaired memory for past and recent events. The tongue deviated to the right when protruded and the palpebral fissure on the left was obliterated. Facial movements on the left side were weaker with the exception of the forehead. There was a left hemiparesis. Reflexes were hyperactive, with a Chaddock and Oppenheim on the left and a Gordon and Chaddock on the right.

URINE: Yellow; acid; sp. gr. 1012; no sugar nor albumen; few WBC in sediment.

BLOOD: 85% Hgb.; 4,500,000 R.B.C.; 13,600 W.B.C.; Kahn negative; N.P.N. 22; B.S. 77.

LUMBAR PUNCTURE: I.P. 250; dynamics normal; 10 cc. removed; F.P. 65; appearance slightly yellow; 12 W.B.C.; 0 polys; 8 R.B.C.; positive Ross-Jones and Pandy; protein 510 mg/100 cc.; sugar 100 mg/100 cc.; chloride 671 mg/100 cc.; gold sol 0112233332; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**

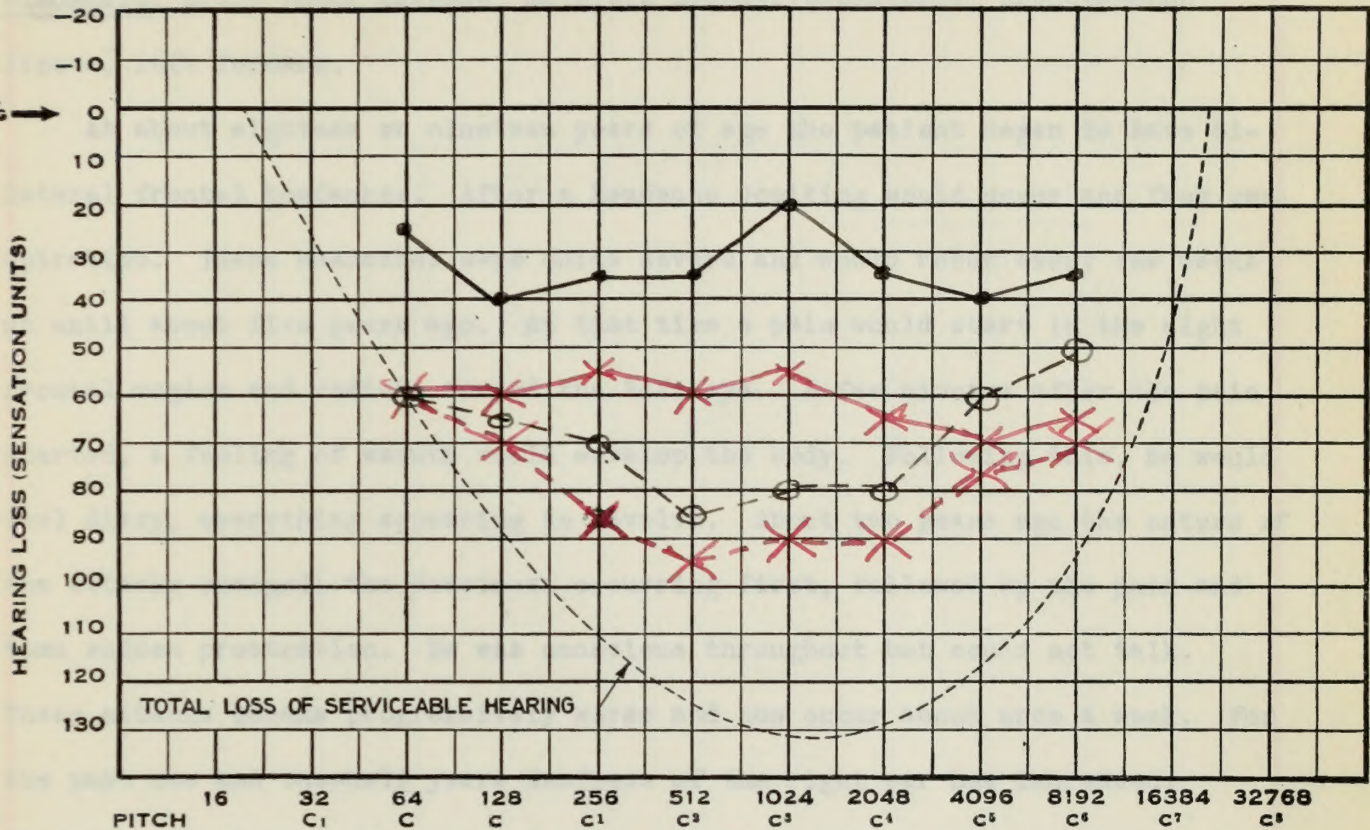
NAME

A. G.

724691

DATE

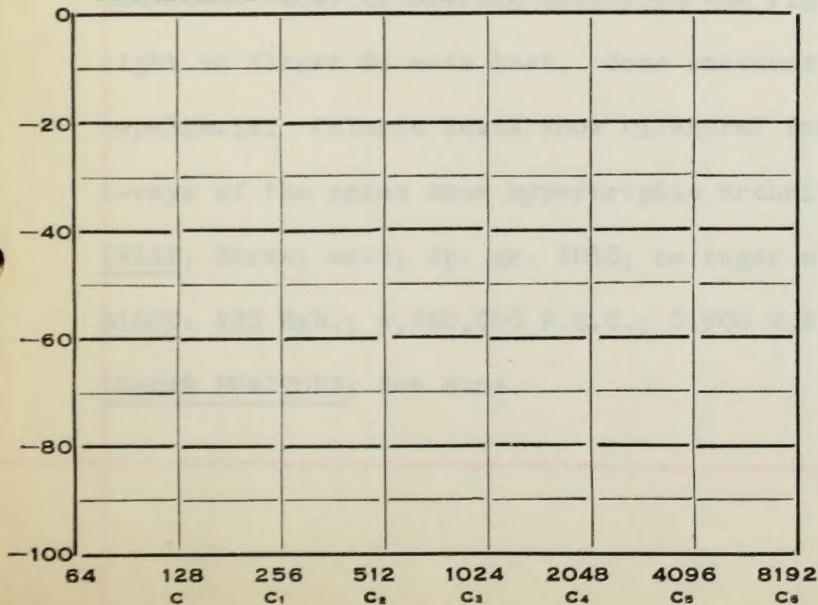
19



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber Not Recorded

Disease

Duration

Chief Symptom.....

1. Deafness.....

2. Pain.....

3. Discharge.....

4. Tinnitus.....

5. Headache.....

6. Dizziness.....

RightLeft

..... Rinne AC

..... Weber BC

..... Upper Limit.....

..... Lower Limit.....

..... Whisper.....

..... Voice.....

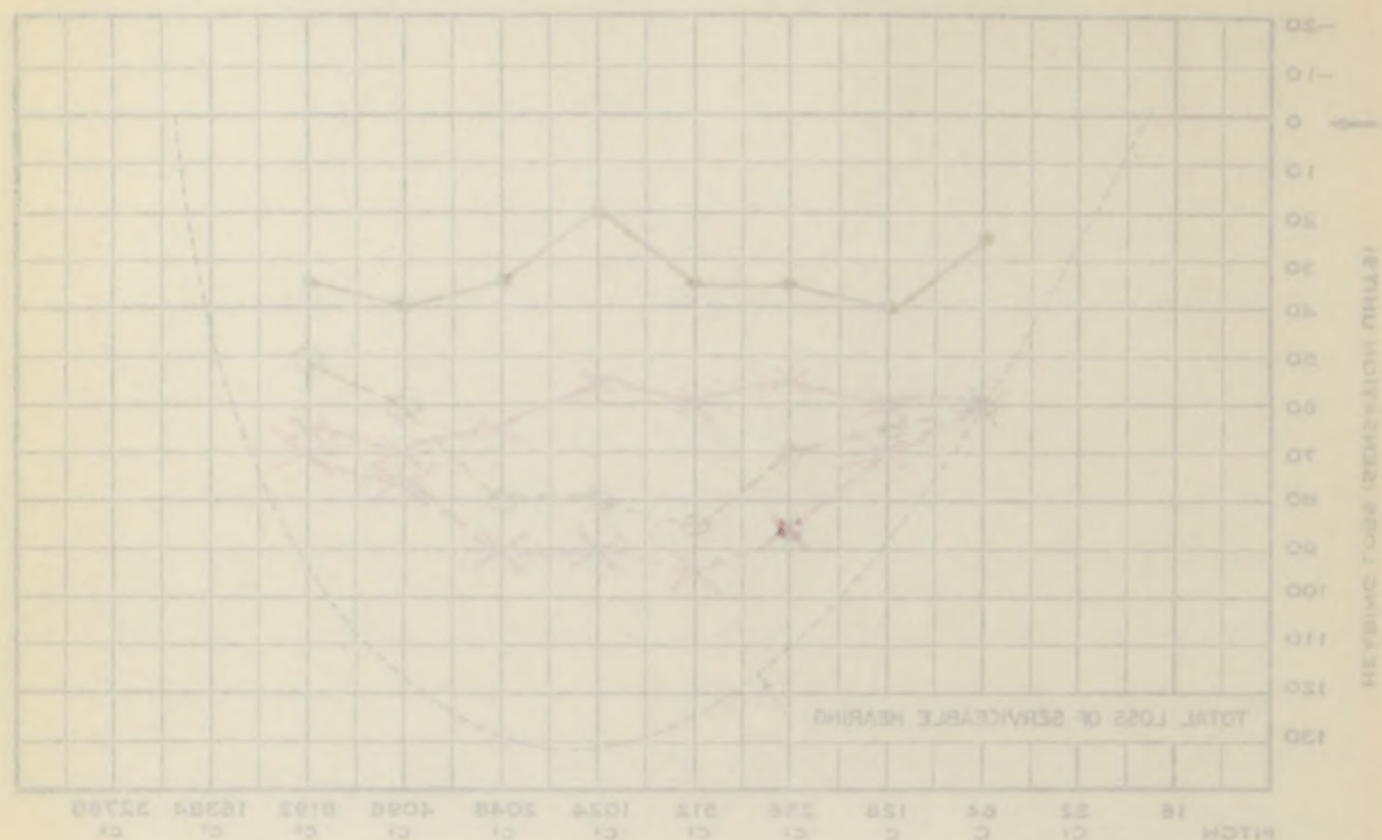
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

R. G.

7-4-51



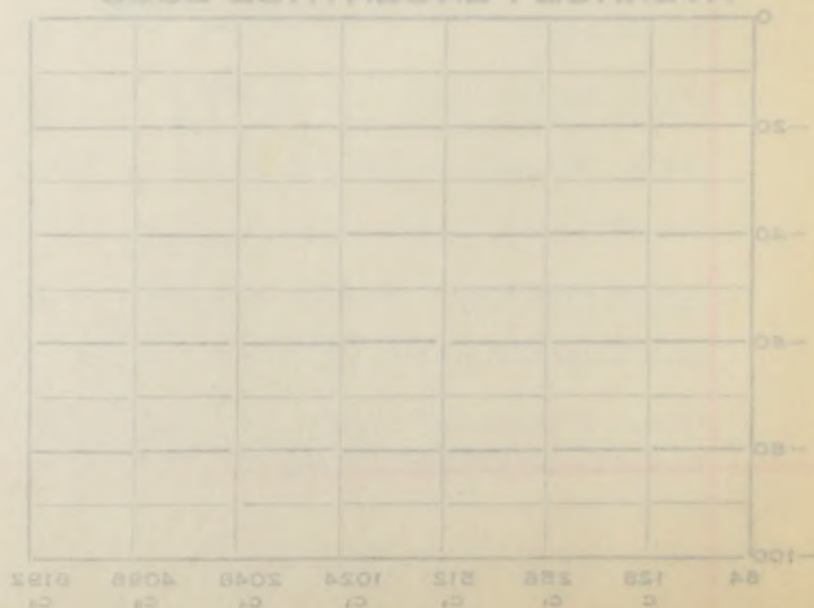
Frequency (Hz)

Right Ear

Left Ear

Weber Not Recorded

AVERAGE PERCENTAGE LOSS



Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right

Left

Knee

Wrist

Upper Limb

Lower Limb

Whisper

Voice

EVANS MEMORIAL

A...G...; #724,691; Male; Age 59; White; Married.

DIAGNOSIS: Brain tumor suspect; multiple neuro-fibromatosis; subcutaneous lipoma, left forearm.

At about eighteen or nineteen years of age the patient began to have bilateral frontal headaches. After a headache vomiting would occur and free perspiration. These headaches were quite severe and would recur every few weeks up until about five years ago. At that time a pain would start in the right frontal region and radiate toward the left eye. A few minutes after the pain started, a feeling of warmth would envelop the body. Following this, he would feel dizzy, everything appearing to revolve. About two years ago the nature of the attacks changed; the dizziness occurring first, followed by the pain and then sudden prostration. He was conscious throughout but could not talk. These attacks became progressively worse and now occur about once a week. For the past one and one-half years deafness of the right ear has increased.

PHYSICAL EXAMINATION: The patient appears well developed and moderately well nourished. There are multiple subcutaneous nodules and the prostate is somewhat enlarged.

NEUROLOGICAL EXAMINATION: Visual acuity is impaired but somewhat corrected by glasses. Margins of the fundi appear hazy and both corneal reflexes are diminished. Loss of hearing acuity in the right ear. Finger deviates to the right on finger to nose test. Some unconnected areas of hypaesthesia and hypalgesia. Caloric tests show bilateral impairment, more marked on the left. X-rays of the spine show hypertrophic arthritis.

URINE: Straw; acid; sp. gr. 1018; no sugar nor albumen.

BLOOD: 85% Hgb.; 4,860,000 R.B.C.; 5,600 W.B.C.; Kahn negative; pr. 140/90.

LUMBAR PUNCTURE: Not done.

A...G...; 4534, 581; hair; Age 58; White; Married.

DIAGNOSIS: Brain tumor suspect; multiple neuro-fibromatosis; subcutaneous

lipoma, left forearm.

At about eighteen or nineteen years of age the patient began to have bilateral frontal headaches. After a headache would occur and three or four days later a headache would occur. These headaches were quite severe and would recur every few weeks. At that time a pain would start in the right frontal region and radiate toward the left eye. A few minutes after the pain started, a feeling of warmth would envelop the body. Following this, he would feel dizzy, everything appearing to revolve. About two years ago the nature of the attacks changed; the dizziness occurring first, followed by the pain and then sudden prostration. He was conscious throughout but could not talk. These attacks became progressively worse and now occur about once a week. For the past one and one-half years deafness of the right ear has increased.

PHYSICAL EXAMINATION: The patient appears well developed and moderately well nourished. There are multiple subcutaneous nodules and the prostate is somewhat enlarged.

NEUROLOGICAL EXAMINATION: Visual acuity is impaired but somewhat corrected by glasses. Margins of the fundi appear hazy and both corneal reflexes are diminished. Loss of hearing acuity in the right ear. Finger displaced to the right on finger to nose test. Some unexplained areas of hyperesthesia and hypesthesia. Babinski tests show bilateral upplantment, more marked on the left. X-rays of the spine show hyperostotic arthritis.

URINE: Sterile; acid; sp. gr. 1018; no sugar nor albumen.

BLOOD: 852 Hgb.; 4,680,000 R.B.C.; 5,800 W.B.C.; Kahn negative; pr. 140/90.

NUMER PUNCTURE: Not done.

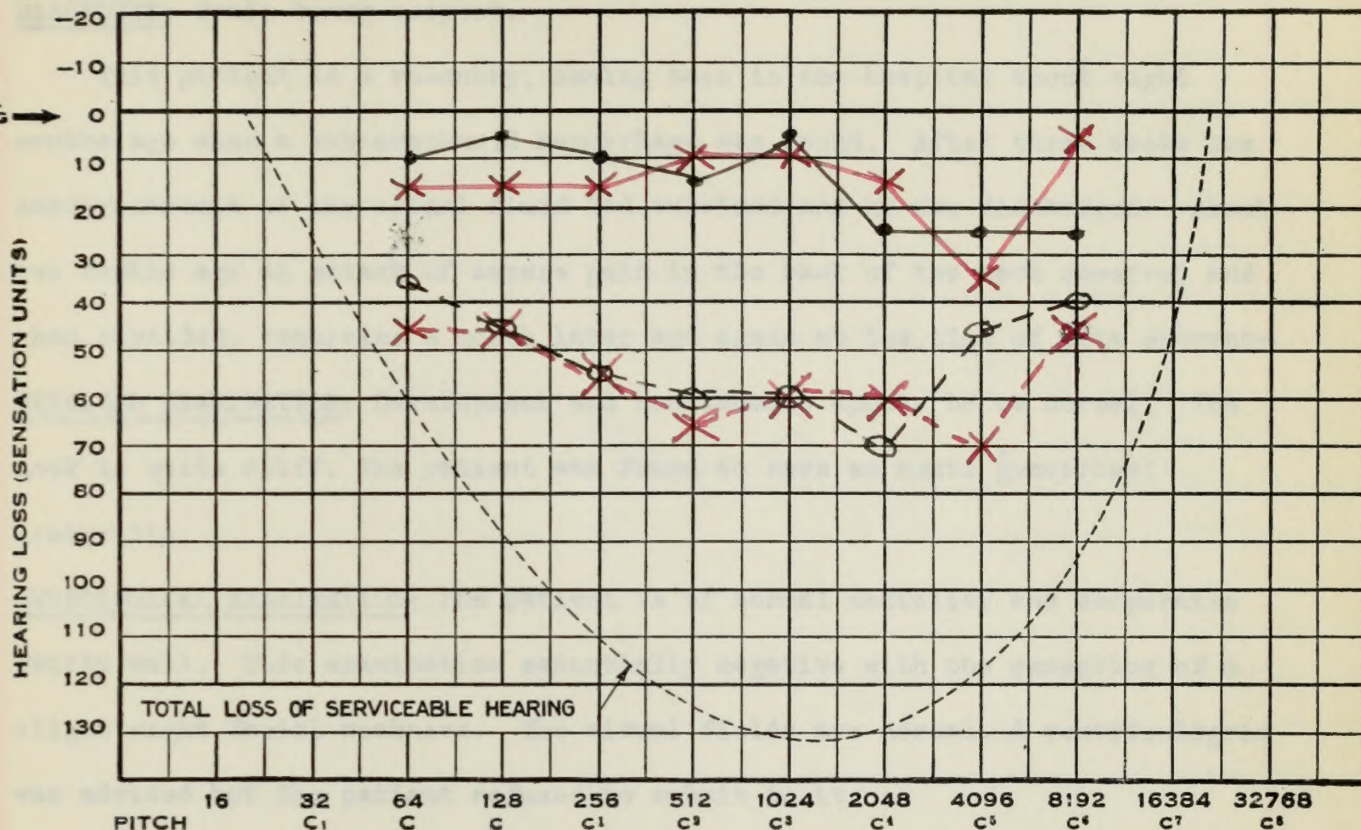
EVANS MEMORIAL**AUDIOGRAM**

NAME

T. O. 725426

DATE

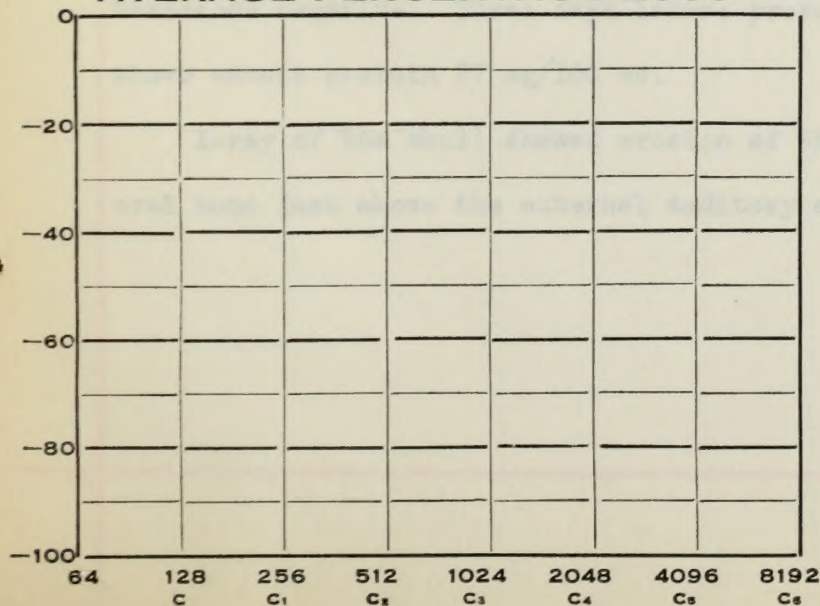
19



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber Left { Vertex
Chin
= at { Nose bridge
Fore head

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

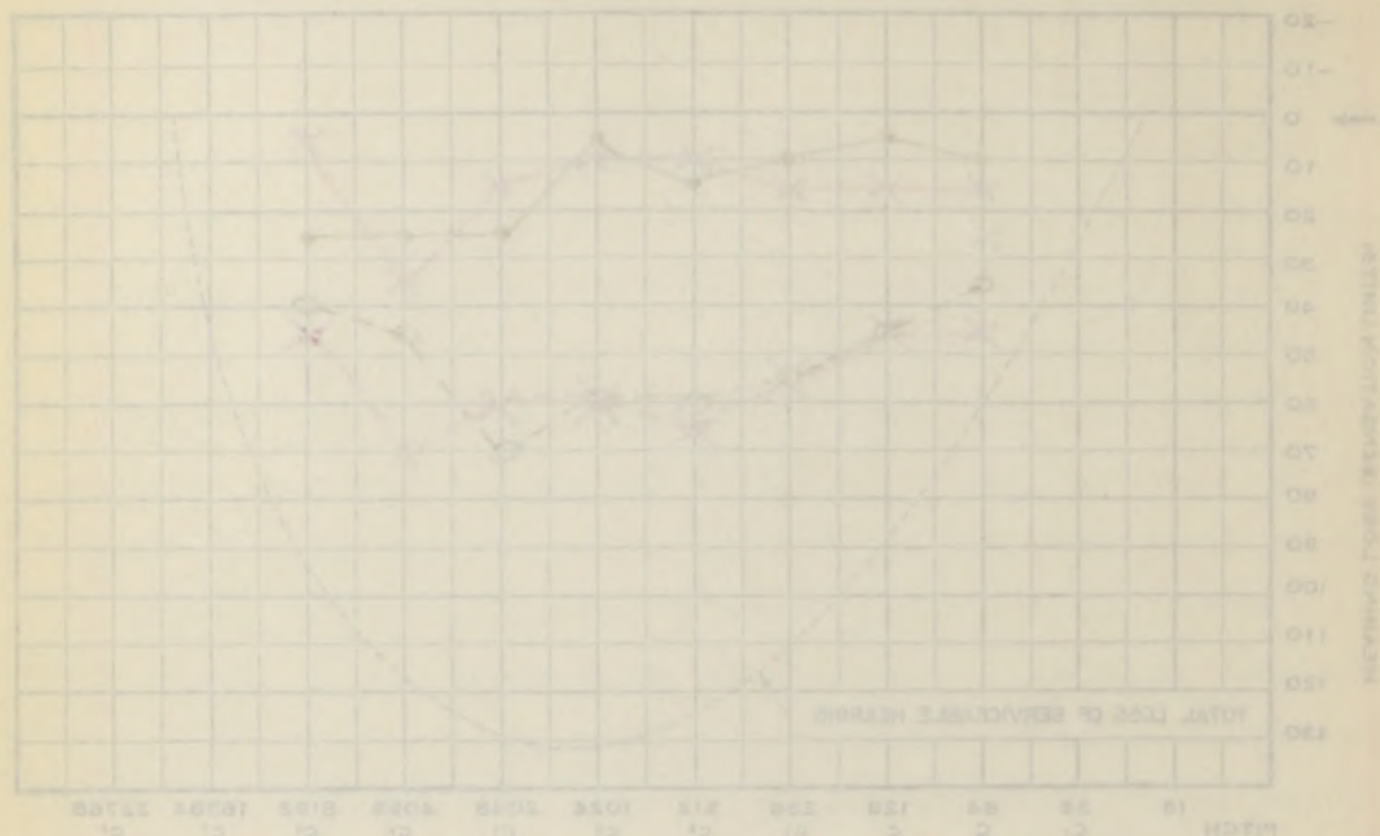
Voice

EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

J. Q. 732436



T... Q...; #725,426; Male; Age 27; White; Single.

DIAGNOSIS: Brain tumor suspect.

This patient is a re-entry, having been in the hospital about eight months ago when a sub-arachnoid hemorrhage was found. After three weeks the xanthochromia of the spinal fluid had subsided and he was discharged. About two months ago an attack of severe pain in the back of the neck occurred and then subsided, recurring a month later and again at the time of this entrance.

PHYSICAL EXAMINATION: Development and nourishment appear to be normal. The neck is quite stiff. The patient was found to have an acute gonorrheal urethritis.

NEUROLOGICAL EXAMINATION: The patient is of normal mentality and cooperates fairly well. This examination essentially negative with the exception of a slight right facial weakness. The visual fields are normal. A ventriculogram was advised but the patient refused to submit to it.

URINE: Yellow; alkaline; sp. gr. 1026; trace of albumen; no sugar; a few pus cells and epithelial cells in sediment.

BLOOD: 90% Hgb.; 4,650,000 R.B.C.; 9,800 W.B.C.; Kahn negative; pr. 120/70.

LUMBAR PUNCTURE: I.P. 230; dynamics normal; 12 cc. removed; F.P. 150; appearance normal; 0 W.B.C. or R.B.C.; protein 53 mg/100 cc.; gold sol 0001110000; Wasserman negative. Three days later: pressure about 250, otherwise as above except protein 27 mg/100 cc.

X-ray of the skull showed erosion of the inner table of the left temporal bone just above the external auditory canal.

T... G...; WVS, 420; Hair; Age 27; White; Female.

DIAGNOSIS: Brain tumor suspected.

This patient is a re-entry, having been in the hospital about eight months ago when a sub-arachnoid hemorrhage was found. After three weeks the cerebrospinal fluid had subsided and he was discharged. About two months ago an attack of severe pain in the back of the neck occurred and then subsided, recurring a month later and again at the time of this entrance.

PHYSICAL EXAMINATION: Development and nourishment appear to be normal. The neck is quite stiff. The patient was found to have an acute hemorrhagic

meningitis.

NEUROLOGICAL EXAMINATION: The patient is of normal mentality and cooperation fairly well. This examination was essentially negative with the exception of a slight right facial weakness. The visual fields are normal. A vestibular

was advised but the patient refused to submit to it.

URINE: Yellow; alkaline; sp. gr. 1.025; trace of albumen; no sugar; a few pus cells and epithelial cells in sediment.

BLOOD: 90% RBC.; 4,550,000 W.B.C.; 4,800 W.B.C.; Kahn negative; gr. 120/70.

LUMBAR PUNCTURE: I.P. 230; dynamics normal; 12 cc. removed; K.F. 180; appear- and normal; 0 W.B.C. or R.B.C.; protein 23 mg/100 cc.; total solid 0.001110000;

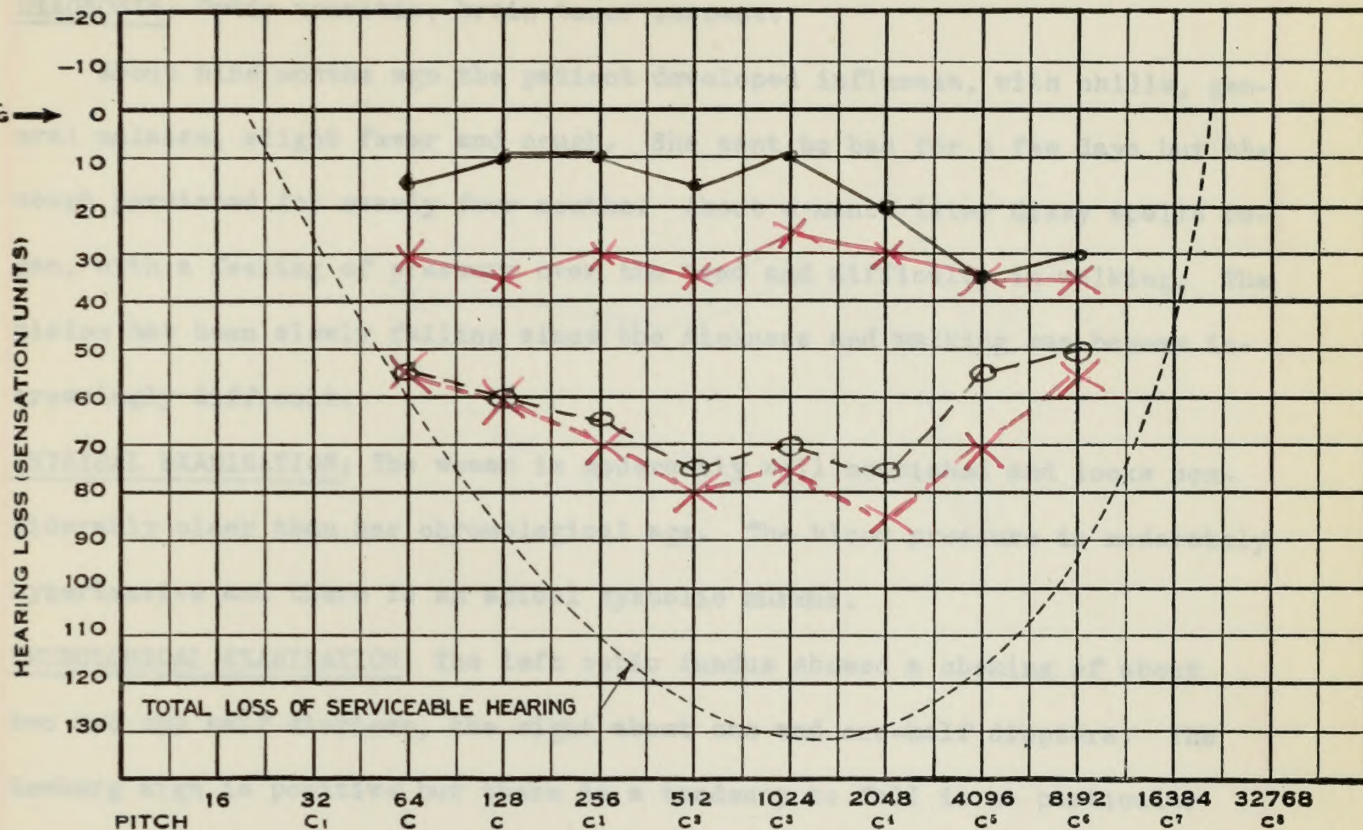
Wassermann negative. Three days later; prostate about 250, otherwise as above except protein 27 mg/100 cc.

X-ray of the skull showed erosion of the inner table of the left temp-oral bone just above the external auditory canal.

EVANS MEMORIAL

AUDIOGRAM

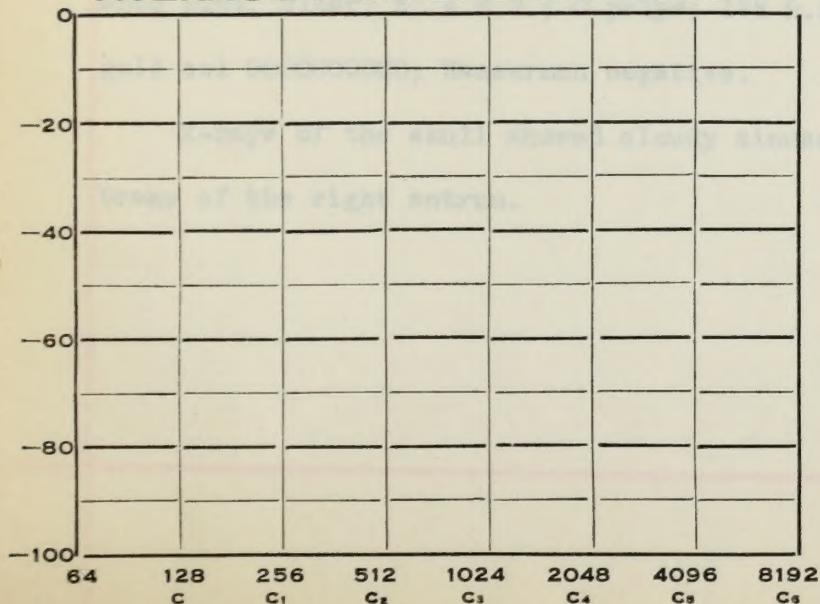
NAME D. S. 723 118
DATE 19



Percentage Hearing Loss

Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Weber Left { Vertex
Chin
= { Nose bridge
Forehead

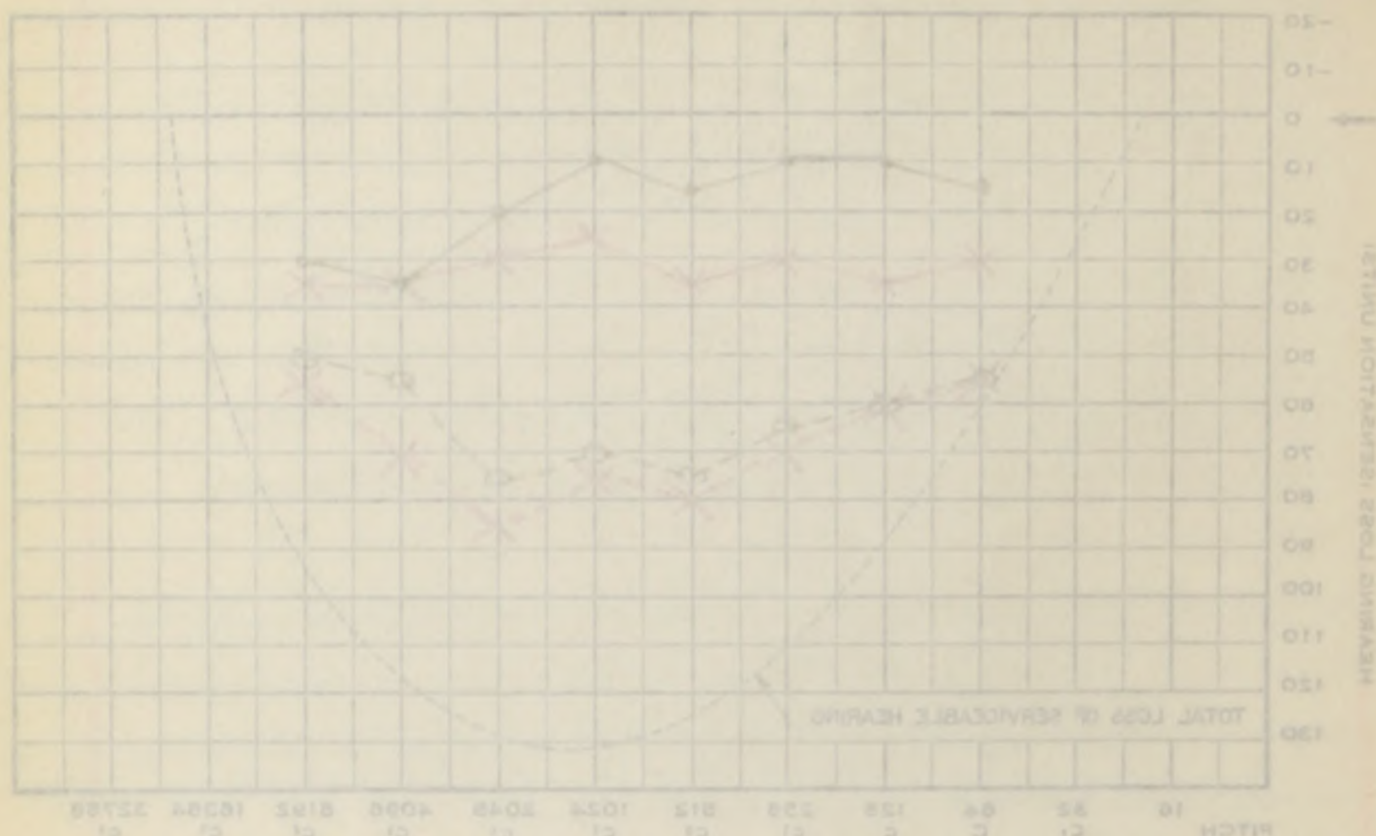
Disease
Duration
Chief Symptom.....
1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....
Right Left
Rinne AC
BC
Weber
Upper Limit.....
Lower Limit.....
Whisper.....
Voice.....

EVANS MEMORIAL

AUDIOGRAM

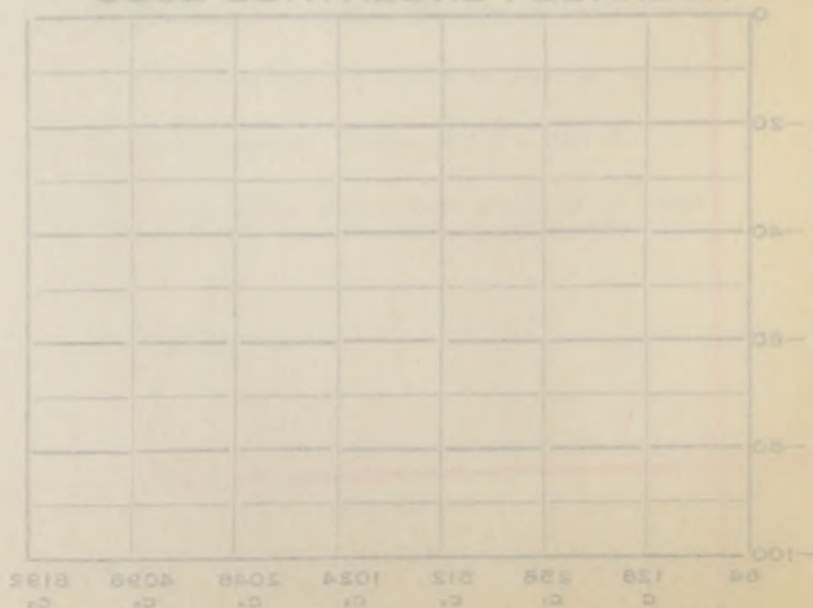
NAME
DATE

D. S. 723 118



Frequency Hearing Loss
Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Webster Left Ear
Nose Bridge
Forehead

Diagnosis
Duration
Chief Symptom

1. Deafness
2. Pain
3. Itching
4. Tingling
5. Headache
6. Dizziness

Right

Left

Rinne
Weber
Upper Limit
Lower Limit
Whisper
Voice

D... S...; #723,118; Female; Age 54; White; Married.

DIAGNOSIS: Optic neuritis; brain tumor suspect.

About nine months ago the patient developed influenza, with chills, general malaise, slight fever and cough. She went to bed for a few days but the cough persisted for nearly four months. About a month later dizzy spells began, with a feeling of pressure over the head and difficulty in walking. The vision has been slowly failing since the sickness and walking has become increasingly difficult.

PHYSICAL EXAMINATION: The woman is moderately well nourished and looks considerably older than her chronological age. The blood pressure is moderately hypertensive and there is an apical systolic murmur.

NEUROLOGICAL EXAMINATION: The left optic fundus showed a choking of about two and one half diopters, the right about one and one-half diopters. The Romberg sign is positive but there is a tendency to fall in no particular direction. In walking the gait is very unsteady. Both pupils react sluggishly to light but are normal to accommodation.

URINE: Yellow; alkaline; sp. gr. 1020; no sugar nor albumen; crystals and occasional white blood and epithelial cells in sediment.

LUMBAR PUNCTURE: I.P. 220; dynamics normal; 10 cc. removed; F.P. 150; appearance pink, clear; 6 W.B.C.; 0 polys; 178 R.B.C.; positive Pandy; gold sol 0000000000; Wasserman negative.

X-rays of the skull showed cloudy sinuses with a thickening of the membrane of the right antrum.

... S...; 4723, 118; Female; Age 54; White; Married.

DIAGNOSIS: Optic neuritis; Brain tumor suspected.

About nine months ago the patient developed influenza, with chills, general malaise, slight fever and cough. She went to bed for a few days but the cough persisted for nearly four months. About a month later dizzy spells began, with a feeling of pressure over the head and difficulty in walking. The vision has been slowly falling since the sickness and walking has become increasingly difficult.

PHYSICAL EXAMINATION: The woman is moderately well nourished and looks considerably older than her chronological age. The blood pressure is moderately hypertensive and there is an epistolic murmur.

NEUROLOGICAL EXAMINATION: The left optic fundus showed a choroid of about two and one half disc diameters, the right about one and one-half disc diameters. The fundus sign is positive but there is a tendency to fall in no particular direction. In walking the gait is very unsteady. Both pupils react sluggishly to light but are normal to accommodation.

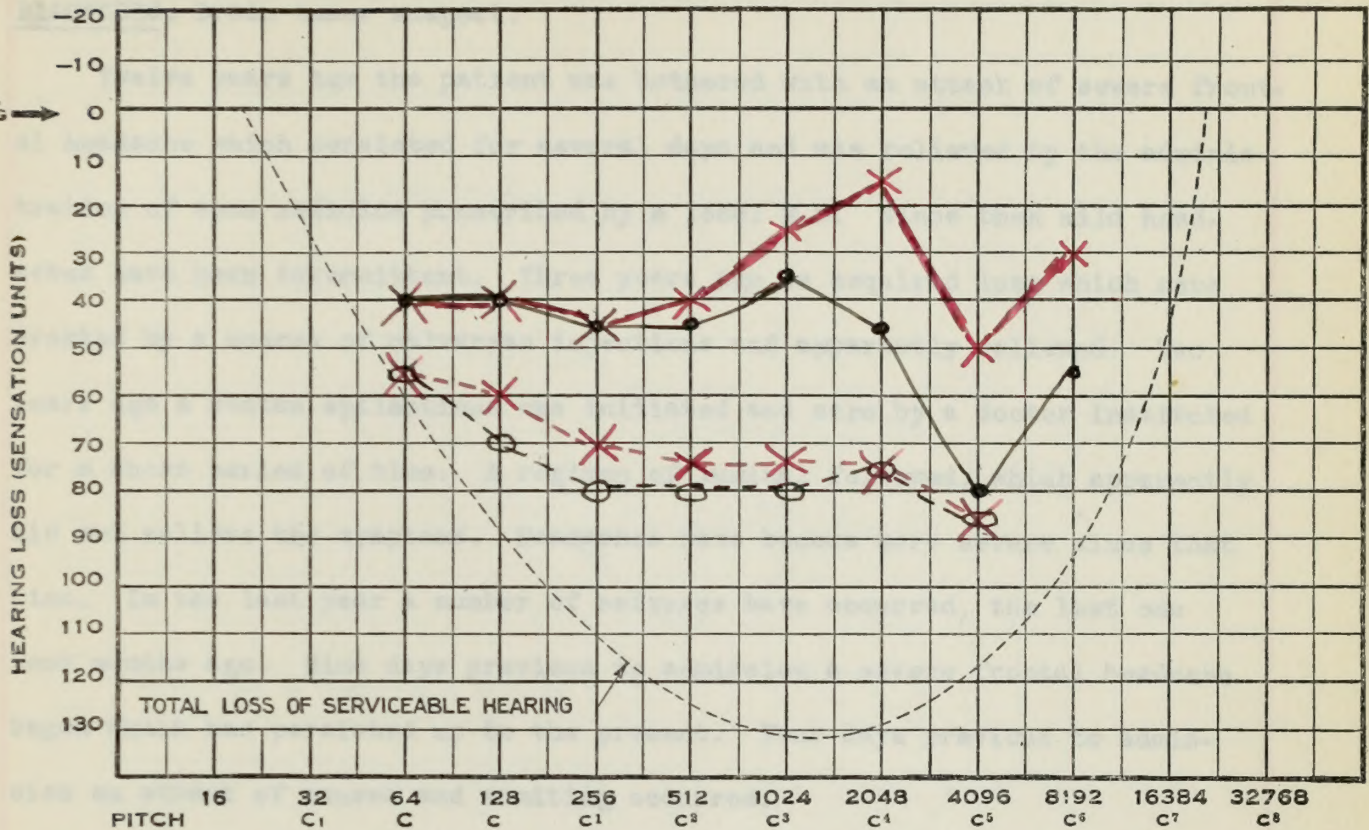
URINE: Yellow; alkaline; sp. gr. 1.020; no sugar nor albumen; crystals and occasional white blood and epithelial cells in sediment.

LABORATORY: I.P. 250; gynadec normal; 10 cc. removed; V.P. 180; appearance pink, clear; S. R.B.C.; 0 polys; 178 R.B.C.; positive Widal; gold sol 000000000; Wassermann negative.

X-rays of the skull showed cloudy sinuses with a thickening of the membranes of the right sinus.

EVANS MEMORIAL**AUDIOGRAM**NAME M.B. 702883.

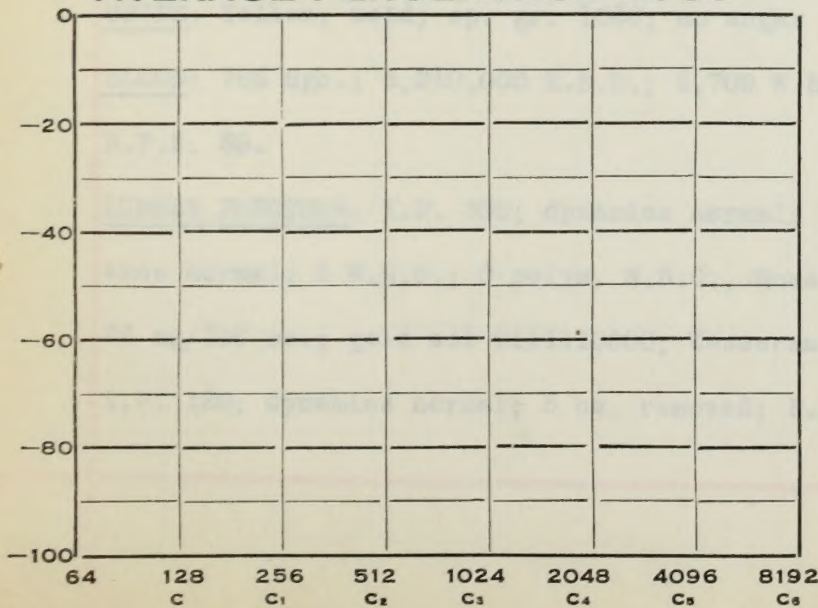
DATE 19



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit

Lower Limit

Whisper

Voice

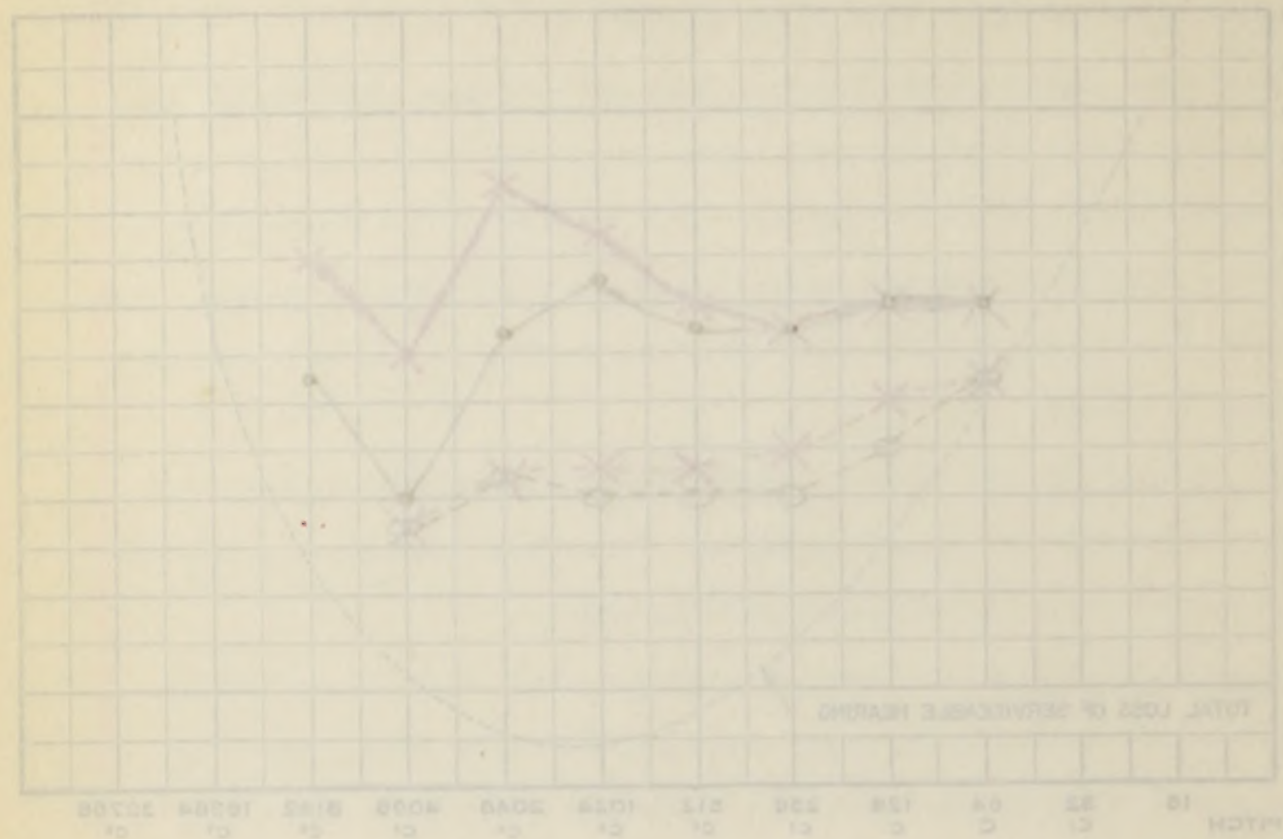
EVANS MEMORIAL

AUDIOGRAM

M.B.

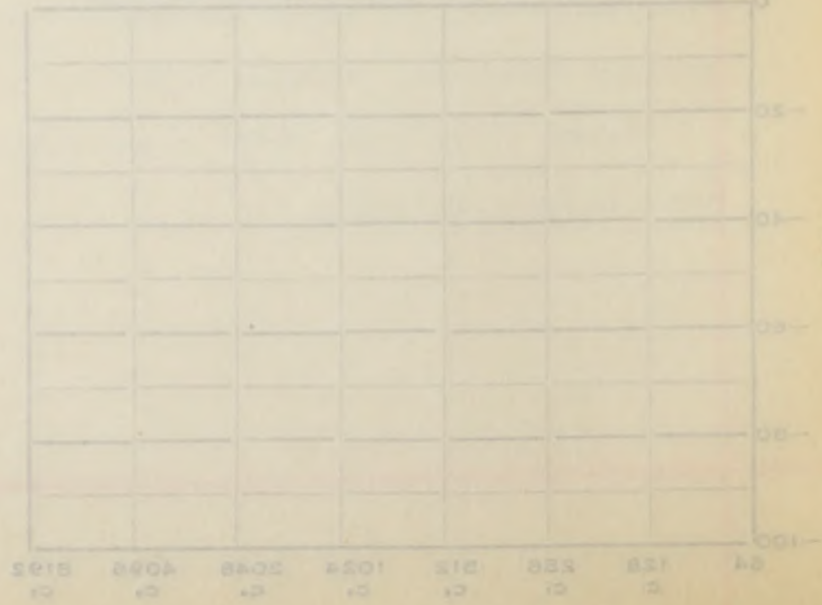
NAME
DATE

705883



Frequency Hearing Loss
Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Diagnosis
Description
Chief Complaint
1. Objective
2. Subjective
3. History
4. Physical
5. Laboratory
6. Treatment
7. Prognosis
8. Other
9. Remarks
10. Signature
11. Date
12. Initials
13. Address
14. Phone
15. Other
16. Notes
17. Other
18. Other
19. Other
20. Other

M... B...; #702,883; Male; Age 34; White; Married.

DIAGNOSIS: Brain tumor suspect.

Twelve years ago the patient was bothered with an attack of severe frontal headache which persisted for several days and was relieved by the administration of some medicine prescribed by a local M.D. Since then mild headaches have been intermittent. Three years ago he acquired lues which were treated by a course of salvarsan injections and apparently relieved. Two years ago a status epilepticus was initiated and care by a doctor instituted for a short period of time. A regimen of luminal followed, which apparently did not relieve the symptoms. Headaches have become more severe since that time. In the last year a number of seizures have occurred, the last one four months ago. Nine days previous to admission a severe frontal headache began which has persisted up to the present. Four days previous to admission an attack of nausea and vomiting occurred.

PHYSICAL EXAMINATION: The man is well developed and apparently not acutely ill but complains of an excruciating frontal headache.

NEUROLOGICAL EXAMINATION: The patient tries to cooperate but due to language difficulty it is rather difficult. The only abnormal finding is myopia of both eyes with small hemorrhagic areas of the right fundus.

URINE: Yellow; acid; sp. gr. 1026; no sugar nor albumen.

BLOOD: 75% Hgb.; 5,210,000 R.B.C.; 6,700 W.B.C.; Kahn negative; B.S. 112; N.P.N. 35.

LUMBAR PUNCTURE: I.P. 350; dynamics normal; 8 cc. removed; F.P. 140; appearance normal; 5 W.B.C.; 0 polys, W.B.C., Ross-Jones nor Pandy; protein 26 mg/100 cc.; gold sol 0111110000; Wasserman negative. Two weeks later: I.P. 120; dynamics normal; 5 cc. removed; F.P. 40; 2 W.B.C.; 0 R.B.C.

M... B... : 4702, 883; Male; Age 34; White; Married.

DIAGNOSIS: Brain tumor suspected.

Twelve years ago the patient was bothered with an attack of severe frontal headache which persisted for several days and was relieved by the administration of some medicine prescribed by a local M.D. Since then mild headaches have been intermittent. Three years ago he acquired ones which were treated by a course of anesthetic injections and apparently relieved. Two years ago a status epilepticus was initiated and care by a doctor instituted for a short period of time. A regimen of luminal followed, which apparently did not relieve the symptoms. Headaches have become more severe since that time. In the last year a number of seizures have occurred, the last one four months ago. Nine days previous to admission a severe frontal headache began which has persisted up to the present. Four days previous to admission an attack of nausea and vomiting occurred.

PHYSICAL EXAMINATION: The man is well developed and apparently not acutely

ill but complains of an excruciating frontal headache.

NEUROLOGICAL EXAMINATION: The patient tries to cooperate but due to language

difficulty it is rather difficult. The only abnormal finding is spasm of

both eyes with small hemorrhagic areas of the right fundus.

URINE: Yellow; acid; sp. gr. 1025; no sugar nor albumen.

BLOOD: VSG Hgb.; 8,210,000 R.B.C.; 8,700 W.B.C.; Kahn-negative; B.S. 112;

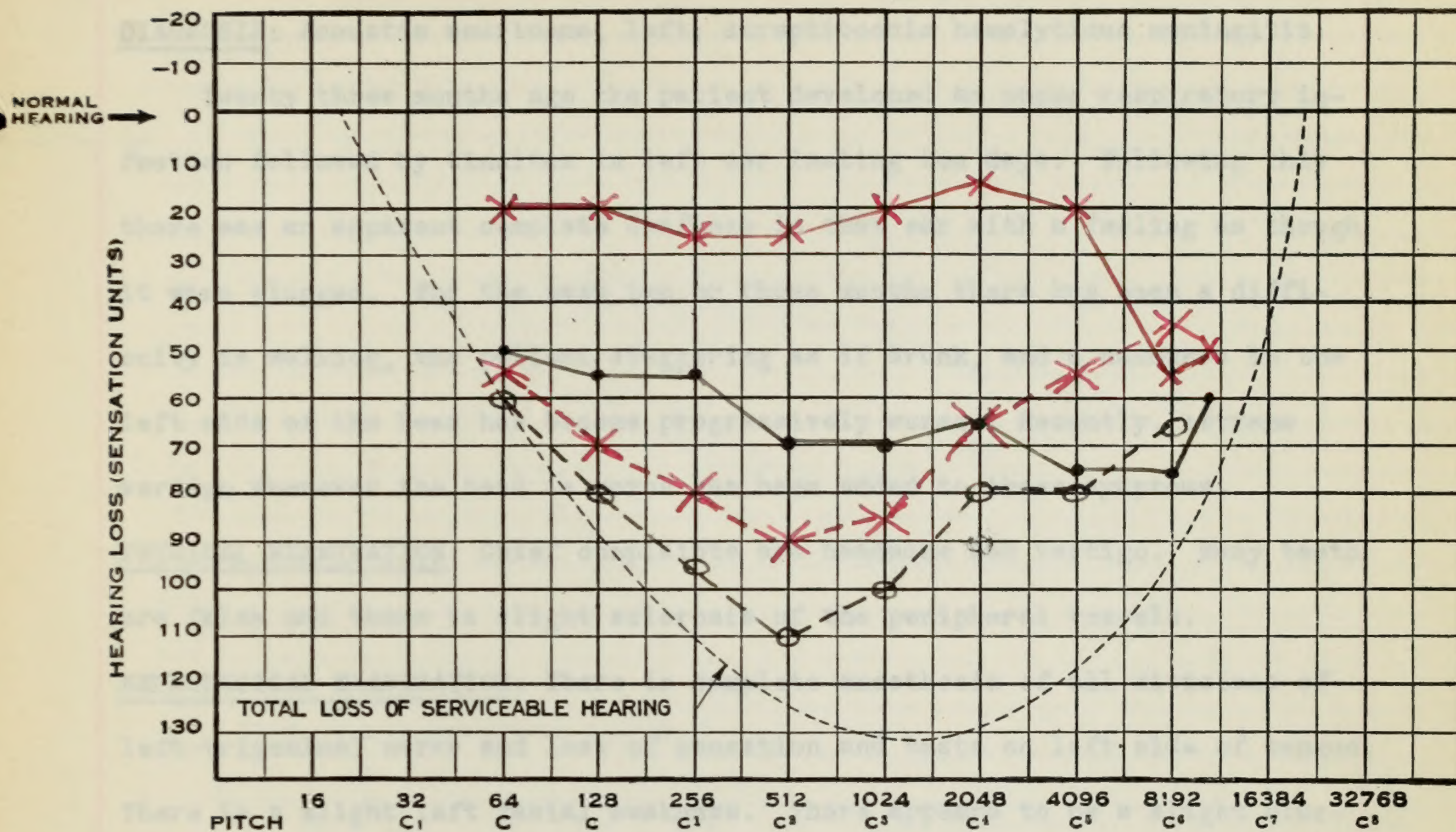
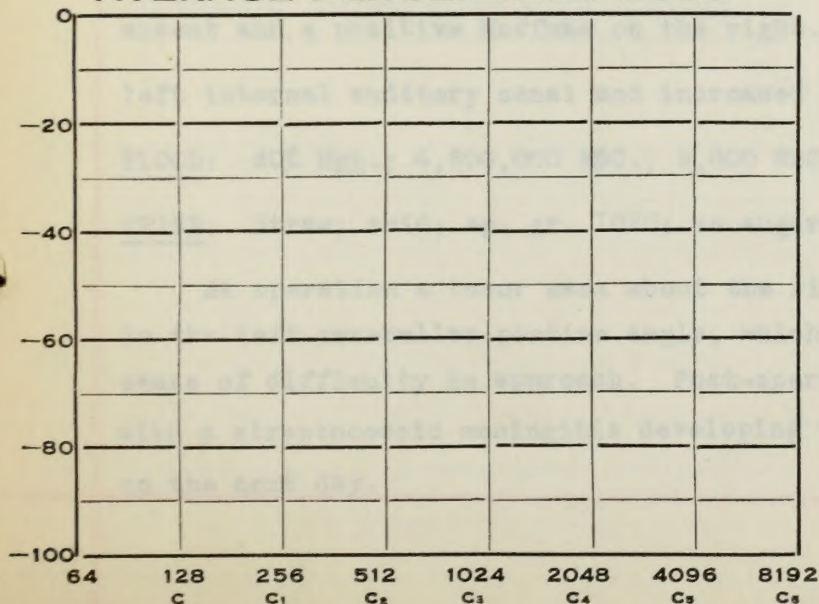
M.F.W. 32.

LUMBAR PUNCTURE: I.P. 380; dynamics normal; 5 cc. removed; F.F. 140; appear-

ance normal; 5 W.B.C.; 0 Polys, W.B.C., Ross-Jones not found; protein

28 mg/100 cc.; Gold sol 011110000; Wasserman negative. Two weeks later:

I.P. 120; dynamics normal; 5 cc. removed; F.F. 40; 2 W.B.C.; 0 R.B.C.

EVANS MEMORIAL**AUDIOGRAM**NAME S. L. T. 731090
DATE..... 19.....**AVERAGE PERCENTAGE LOSS***Weber Right at 4 Points.*

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain
3. Discharge.....
4. Tinnitus
5. Headache
6. Dizziness

Right Left

Rinne AC

BC

Weber

Upper Limit.....

Lower Limit.....

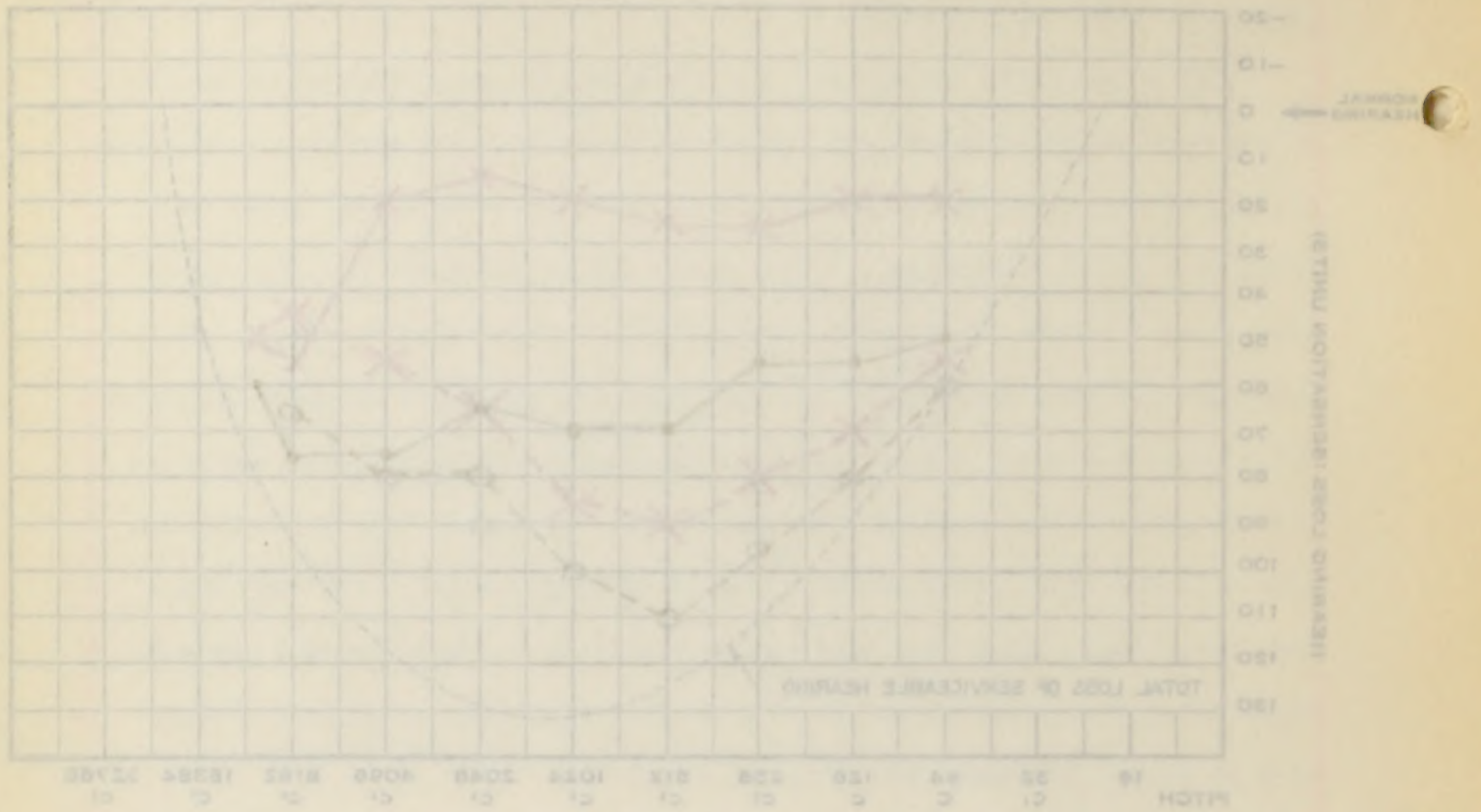
Whisper

Voice

EVANS MEMORIAL

NAME 2, A. T. 731090
DATE 78

AUDIOGRAM



Percentage Hearing Loss

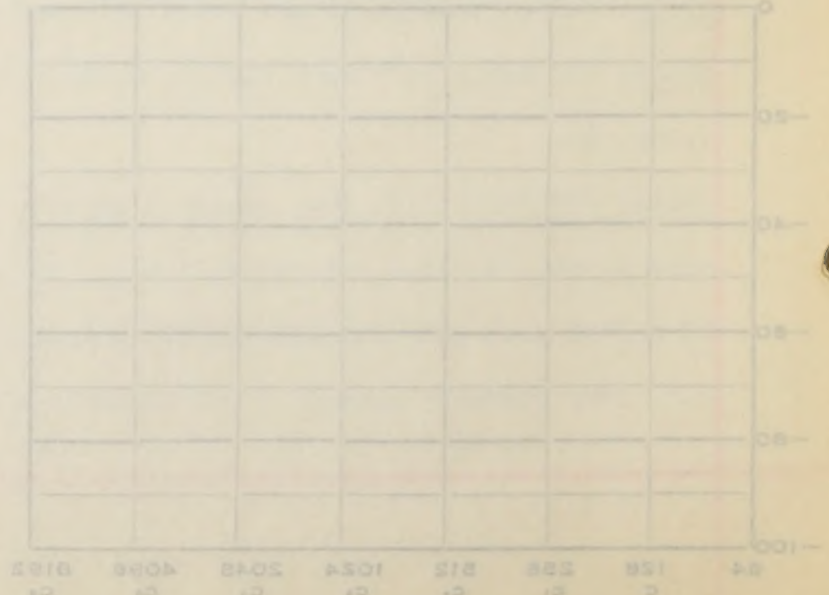
Right Ear

Left Ear

Tone Conduction for 212, 1024, 2048, 4096, 8192 Hz in the Left Ear were tested in the Right Ear

Weber Right at 4 Points.

AVERAGE PERCENTAGE LOSS



Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

Distance

S...L...T...; #731,090; Female; Age 51; White; Married.

DIAGNOSIS: Acoustic neurinoma, left; streptococcic hemolyticus meningitis.

Twenty three months ago the patient developed an upper respiratory infection followed by tinnitus in left ear lasting ten days. Following this there was an apparent complete deafness in that ear with a feeling as though it were plugged. For the past two or three months there has been a difficulty in walking, the patient staggering as if drunk, and a numbness in the left side of the head has become progressively worse. Recently, extreme vertigo whenever the head is moved has been added to these symptoms.

PHYSICAL EXAMINATION: Chief complaints are headache and vertigo. Many teeth are false and there is slight sclerosis of the peripheral vessels.

NEUROLOGICAL EXAMINATION: There is complete anesthesia of all divisions of left trigeminal nerve and loss of sensation and taste on left side of tongue. There is a slight left facial weakness. There appears to be a slight blurring of the nasal margins of the discs. There is a marked nystagmus on looking to left and patient walks with feet wide apart in an ataxic manner. There is a definite lateral pulsion to the left with falling to that side with eyes opened or closed. Slight motor weakness on right side. The deep reflexes are hyperactive throughout, more on the right, with the abdominals absent and a positive Hoffman on the right. X-rays showed a widening of left internal auditory canal and increased radius.

BLOOD: 80% Hgb.; 4,600,000 RBC.; 9,800 WBC.; pr.146/100; Kahn negative.

URINE: Straw; acid; sp. gr. 1020; no sugar nor albumen.

At operation a tumor mass about the size of an english walnut was found in the left cerebellar pontine angle, which was only partially removed because of difficulty in approach. Post-operative course was extremely stormy with a streptococcic meningitis developing the third day and death following on the next day.

S...I...T...; 4731,020; Female; Age 51; White; Married.

DIAGNOSIS: Acoustic neuroma, left; streptococcal meningitis.

Twenty three months ago the patient developed an upper respiratory infection followed by tinnitus in left ear lasting ten days. Following this there was an apparent complete deafness in that ear with a feeling as though it were plugged. For the past two or three months there has been a difficulty in walking, the patient staggering as if drunk, and a numbness in the left side of the head has become progressively worse. Recently, extreme vertigo whenever the head is moved has been added to these symptoms.

PHYSICAL EXAMINATION: Chief complaints are headache and vertigo. Many teeth are false and there is slight sclerosis of the peripheral vessels.

NEUROLOGICAL EXAMINATION: There is complete anesthesia of all divisions of left trigeminal nerve and loss of sensation and taste on left side of tongue. There is a slight left facial weakness. There appears to be a slight shrink of the nasal margins of the disc. There is a marked nystagmus on looking to left and patient walks with feet wide apart in an ataxic manner. There is a definite lateral pulsion on the left with falling to that side with eyes opened or closed. Slight motor weakness on right side. The deep reflexes are hyperactive throughout, more on the right, with the abdominal absent and a positive Hoffman on the right. X-rays showed a widening of left internal auditory canal and increased radius.

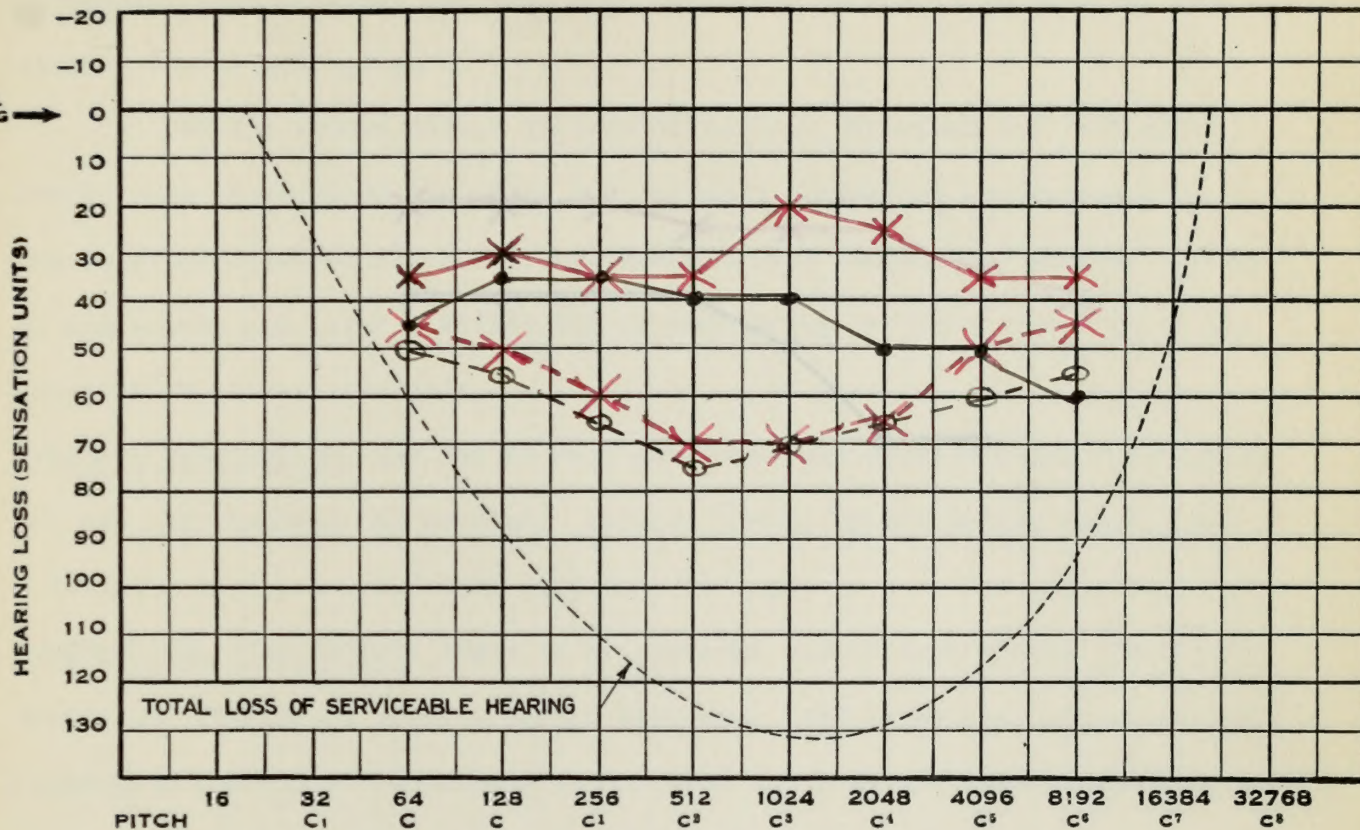
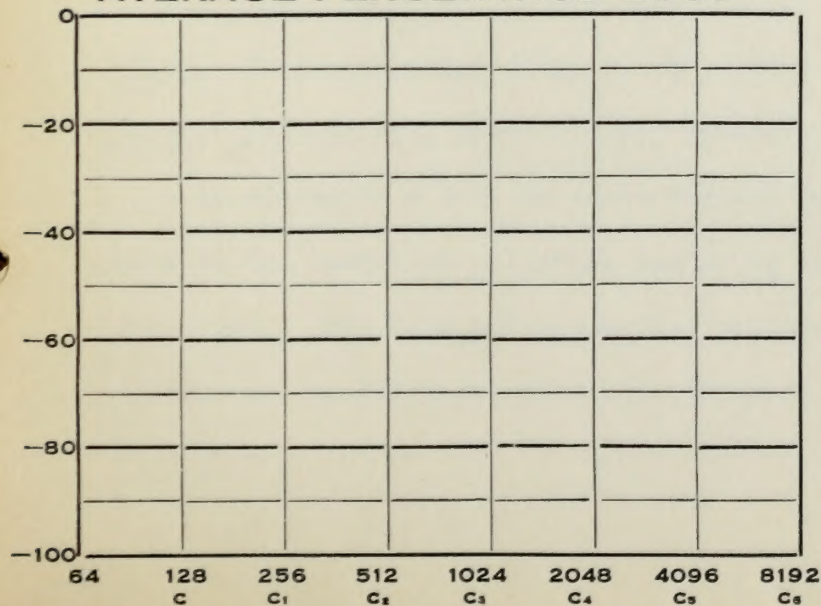
BLOOD: 80% Hgb.; 4,800,000 RBC.; 9,800 WBC.; pr. 148/100; Kahn negative.

URINE: Straw; acid; sp. gr. 1020; no sugar nor albumen.

At operation a tumor mass about the size of an english walnut was found in the left cerebellar pontine angle, which was only partially removed because of difficulty in approach. Post-operative course was extremely stormy with a streptococcal meningitis developing the third day and death following on the next day.

EVANS MEMORIAL**AUDIOGRAM**NAME M. L. 694884

DATE..... 19.....

**AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom.....

1. Deafness.....

2. Pain.....

3. Discharge.....

4. Tinnitus.....

5. Headache.....

6. Dizziness.....

RightLeftRinne ^{AC}
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

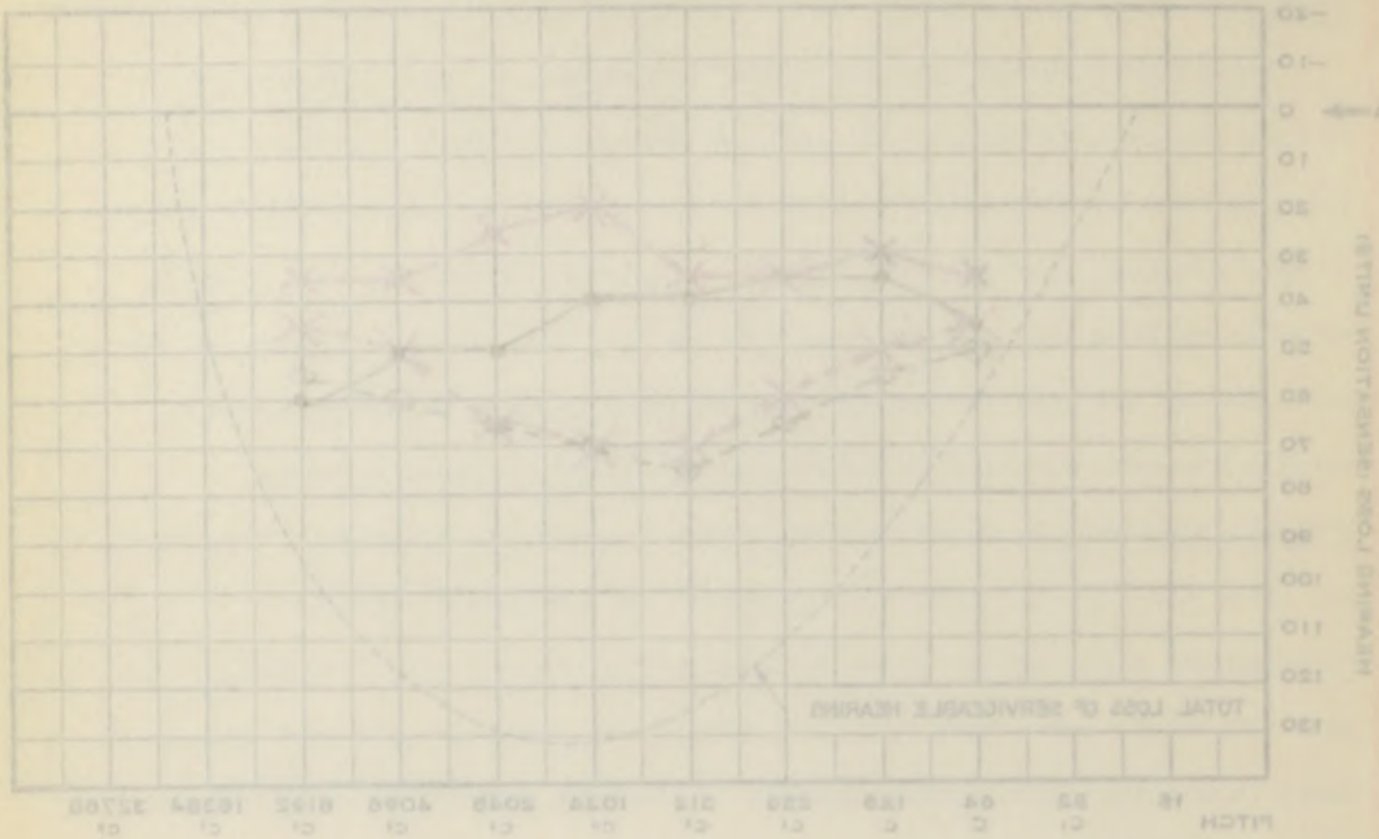
Voice.....

EVANS MEMORIAL

NAME M. A. 694384

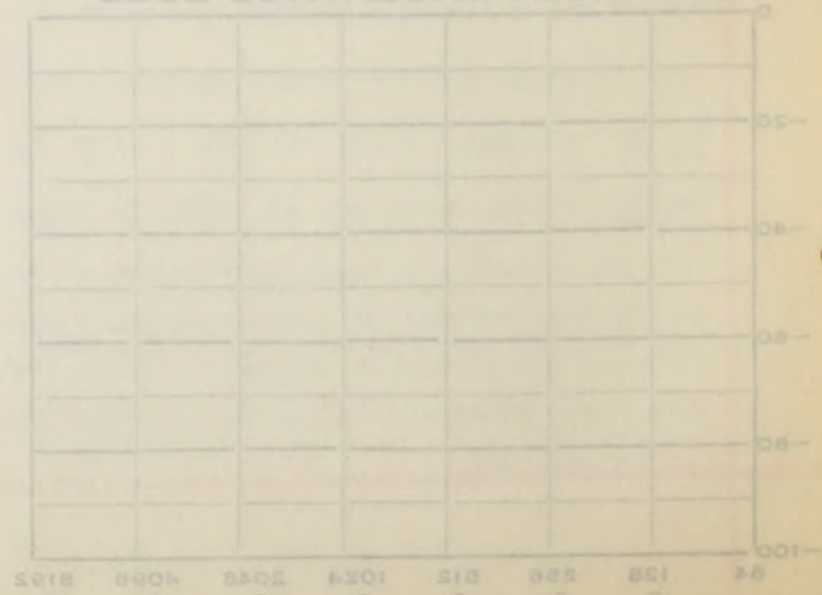
DATE 12

AUDIOGRAM

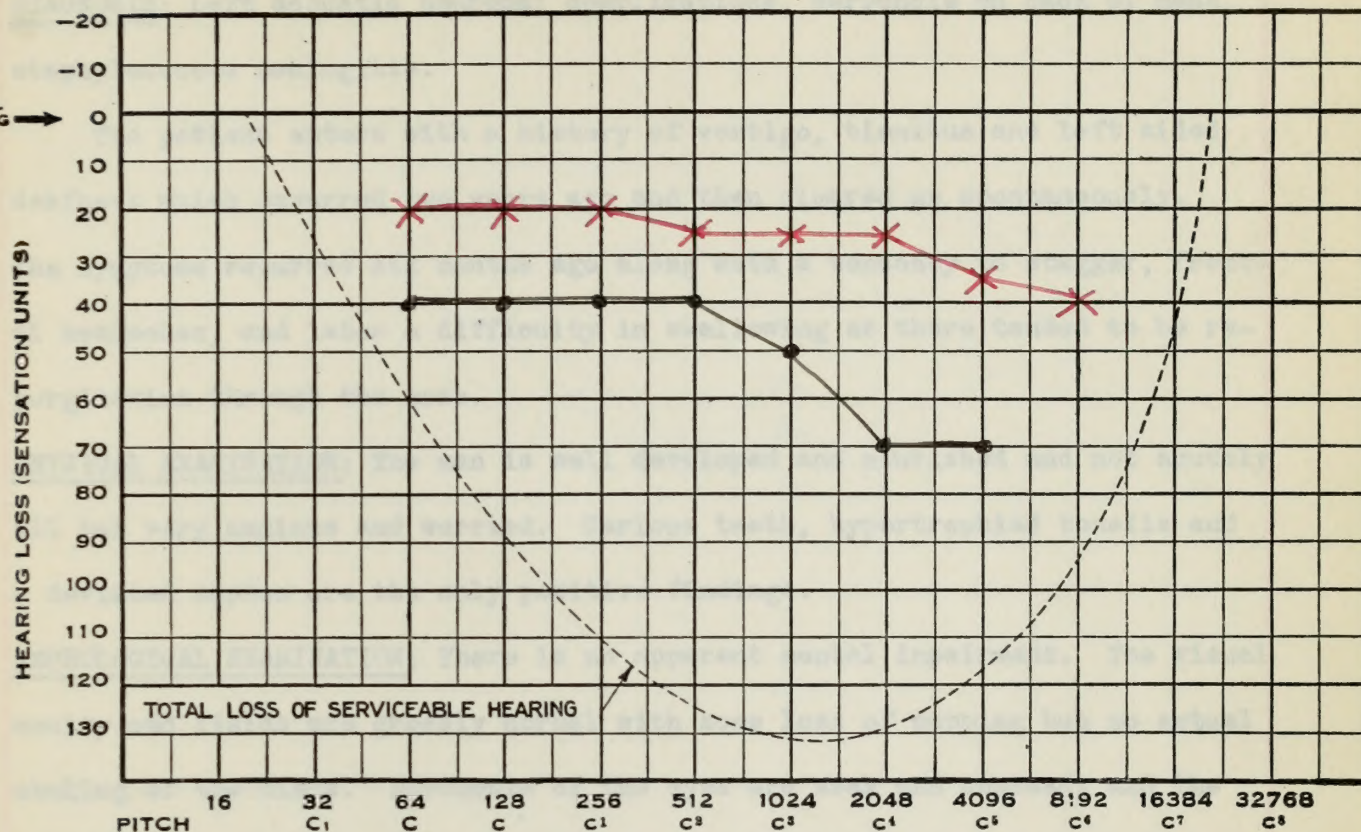


Percentage Hearing Loss
Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



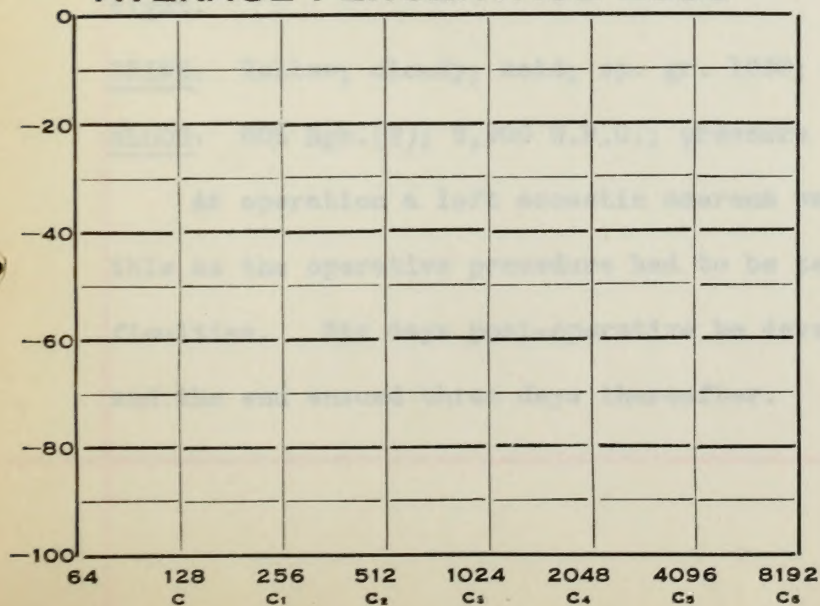
Diagnosis _____
 Duration _____
 Chief Complaint _____
 1. Deafness _____
 2. Pain _____
 3. Dizziness _____
 4. Tinnitus _____
 5. Headache _____
 6. Discharge _____
 Right _____
 Left _____
 AC _____
 BC _____
 Weber _____
 Upper Limit _____
 Lower Limit _____
 Whisper _____
 Voice _____

EVANS MEMORIAL**AUDIOGRAM**NAME M. L. 694884
DATE _____ 19__

Percentage Hearing Loss

Right Ear

Left Ear

*Bone Conduction not recorded.**One Week Later.***AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit

Lower Limit

Whisper

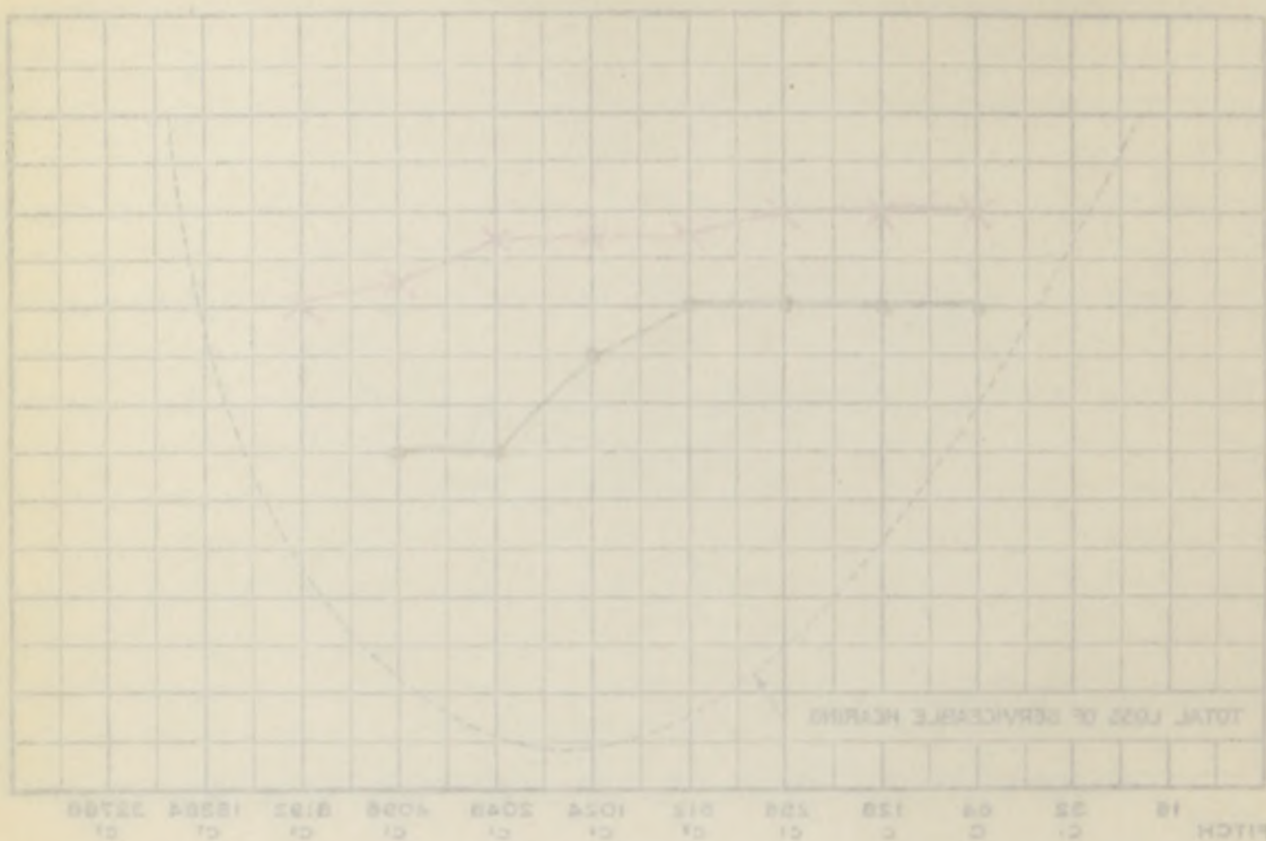
Voice

EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

M. J. Evans



LEFT EAR HEARING (dB HL)

RIGHT EAR HEARING (dB HL)

TOTAL LOSS OF SERVICEABLE HEARING

PITCH

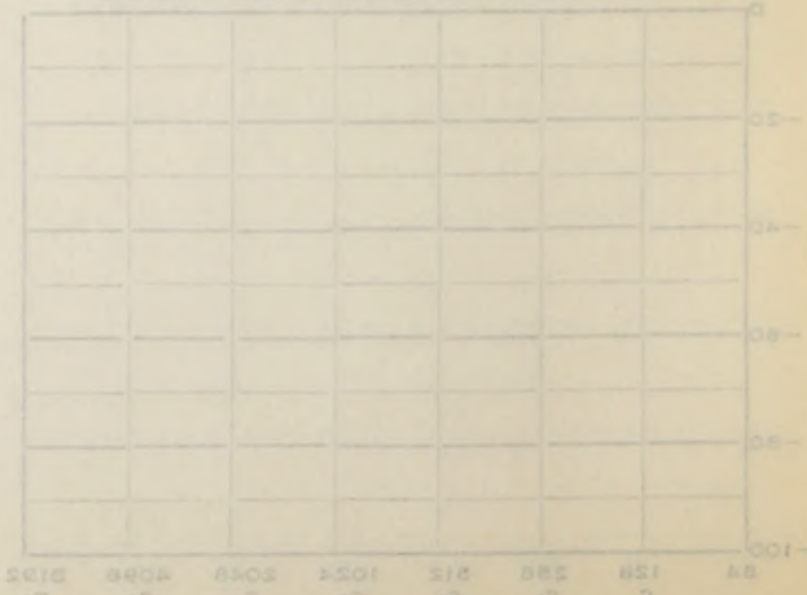
Frequency Hearing Loss

High Ear

Left Ear

Bone Conduction not recorded

AVERAGE PERCENTAGE LOSS



Diagnosis
Duration
Chief Complaint
1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Left

Right
Since
When
Upper Limit
Lower Limit
Tinnitus
Voice

M...L...; #694,884; Male; Age 37; White; Married.

DIAGNOSIS: Left acoustic neuroma; complications, carbuncle on back of neck, staphylacoccus meningitis.

The patient enters with a history of vertigo, tinnitus and left sided deafness which occurred two years ago and then cleared up spontaneously.

The symptoms recurred six months ago along with a tendency to stagger, frontal headaches, and later a difficulty in swallowing as there tended to be regurgitation through the nose.

PHYSICAL EXAMINATION: The man is well developed and nourished and not acutely ill but very anxious and worried. Carious teeth, hypertrophied tonsils and a deviated septum are the only positive findings.

NEUROLOGICAL EXAMINATION: There is no apparent mental impairment. The visual acuity and fields are grossly normal with some loss of cupping but no actual choking of the discs. Movements of the eyes are weak and unsteady and the corneal reflexes are diminished more on the left than on the right. There is bilateral horizontal and vertical nystagmus and vertigo, especially when walking. The gag reflex is markedly diminished and movements of the tongue are weak. The gait is unsteady with a tendency to stagger toward the left. All deep tendon reflexes are hyperactive and there is a positive Hoffman on the right.

URINE: Yellow; cloudy; acid; sp. gr. 1030; no albumen nor sugar.

BLOOD: 80% Hgb.(T); 8,900 W.B.C.; pressure 98/46; Kahn negative.

At operation a left acoustic neuroma was exposed but removal was impossible as the operative procedure had to be terminated due to respiratory difficulties. Six days post-operative he developed a staphylacoccus meningitis and the end ensued three days thereafter.

M...J...; 5594, 804; Male; Age 37; White; Married.

DIAGNOSIS: Left acoustic neuroma; complications, cerebrosis on back of neck, staphylococcus meningitis.

The patient entered with a history of vertigo, tinnitus and left sided deafness which occurred two years ago and then cleared up spontaneously.

The symptoms recurred six months ago along with a tendency to stagger, frontal headaches, and later a difficulty in swallowing as there tended to be no purgation through the mass.

PHYSICAL EXAMINATION: The man is well developed and nourished and not acutely ill but very anxious and worried. Cerebral tests, hyperreflexic tonus and a deviated septum are the only positive findings.

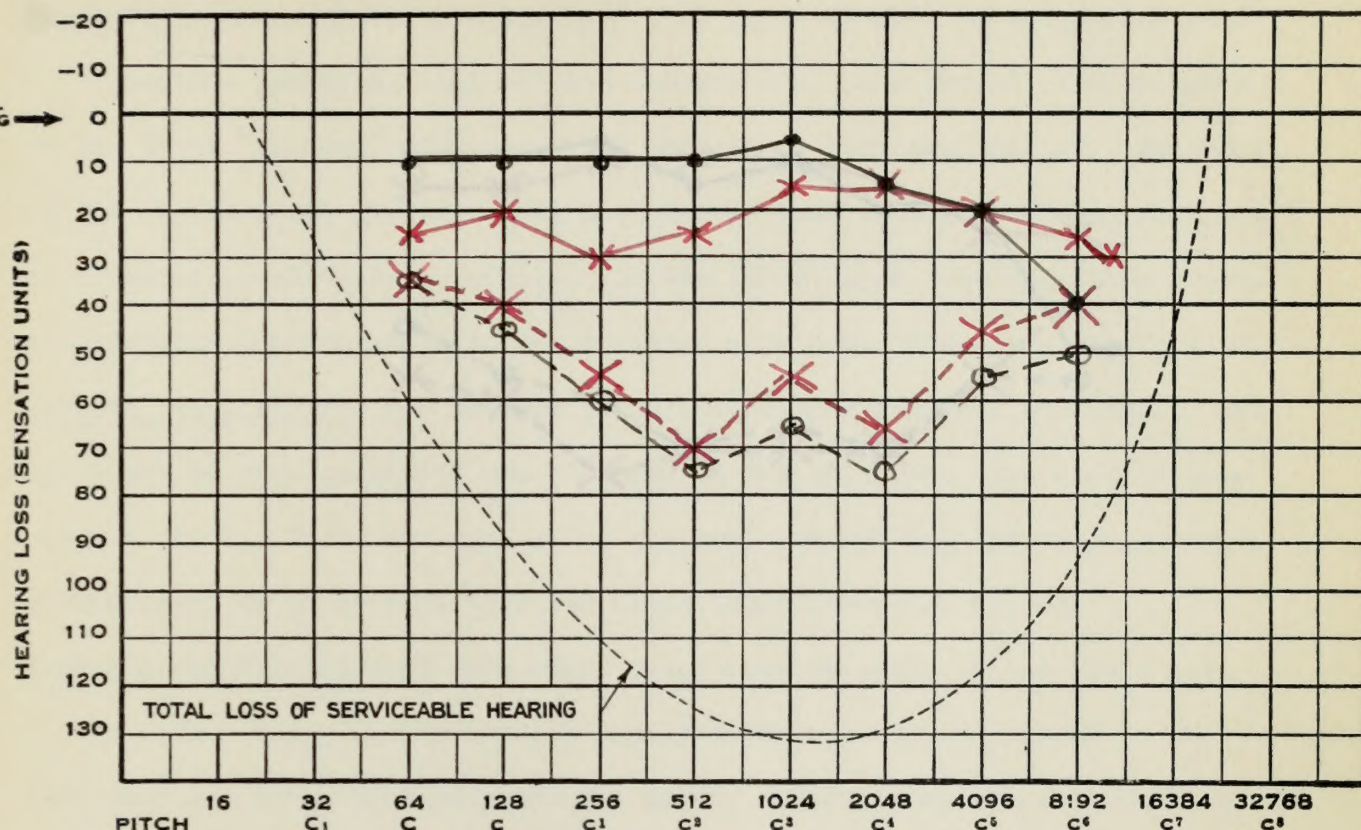
NEUROLOGICAL EXAMINATION: There is no apparent mental impairment. The visual acuity and fields are grossly normal with some loss of cupping but no actual choking of the discs. Movements of the eyes are weak and unsteady and the corneal reflexes are diminished more on the left than on the right. There is bilateral horizontal and vertical nystagmus and vertigo, especially when walking. The gag reflex is markedly diminished and movements of the tongue are weak. The gait is unsteady with a tendency to stagger toward the left. All deep tendon reflexes are hyperactive and there is a positive Hoffman on the right.

URINE: Yellow; cloudy; acid; sp. gr. 1.020; no albumen nor sugar.
BLOOD: 804 Hgb. (T); 8,900 W.B.C.; pressure 92/46; Kahn negative.

At operation a left acoustic neuroma was exposed but removal was impossible as the operative procedure had to be terminated due to respiratory difficulties. Six days post-operative he developed a staphylococcus meningitis and died three days thereafter.

EVANS MEMORIAL**AUDIOGRAM**NAME D. O. S. 724295

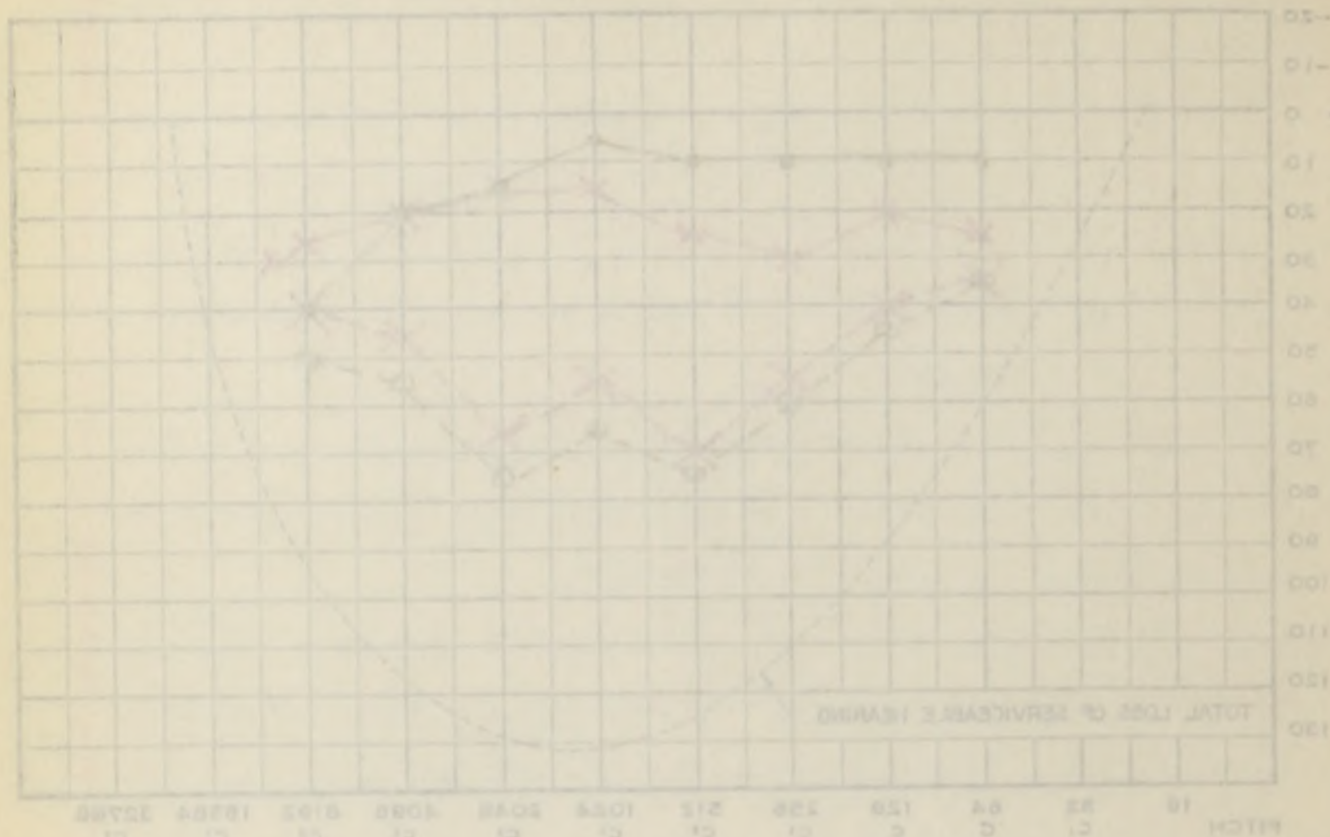
DATE..... 19.....



EVANS MEMORIAL

AUDIOGRAM

NAME D. O. S. 724222
DATE 10 1955



Percentage Hearing Loss

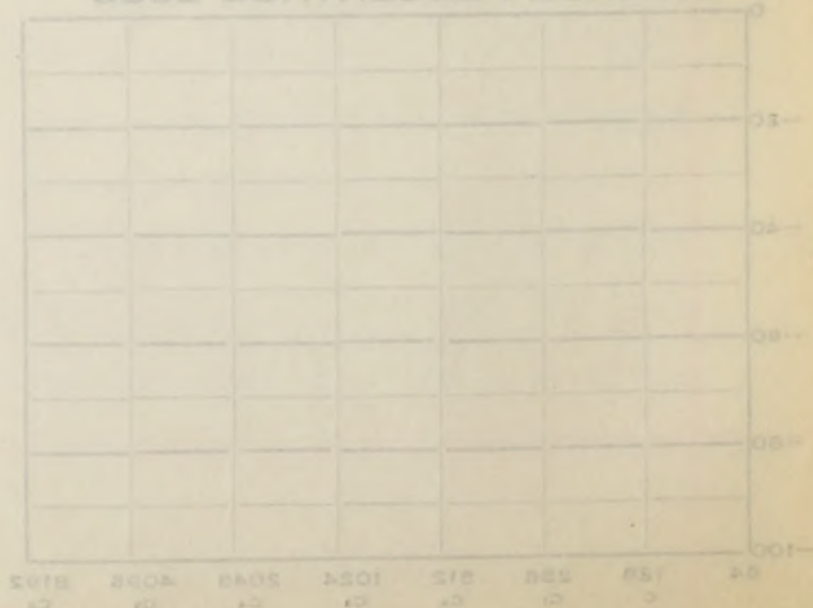
Right Ear

Left Ear

Pre-operative

Weber Right at 4 Points

AVERAGE PERCENTAGE LOSS



Right

Left

Chief Symptom

1. Deafness

2. Tinnitus

3. Discharge

4. Itching

5. Headache

6. Dizziness

Right

Left

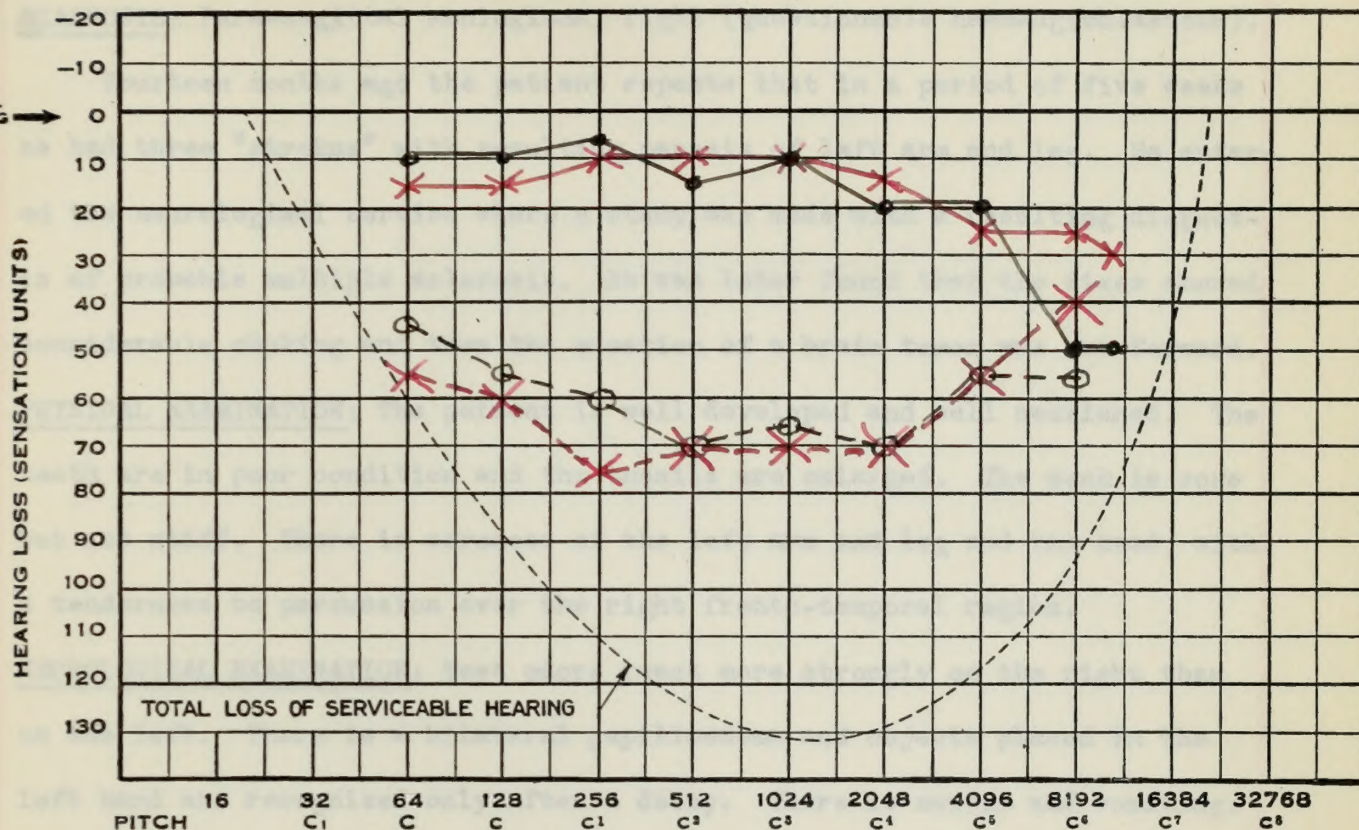
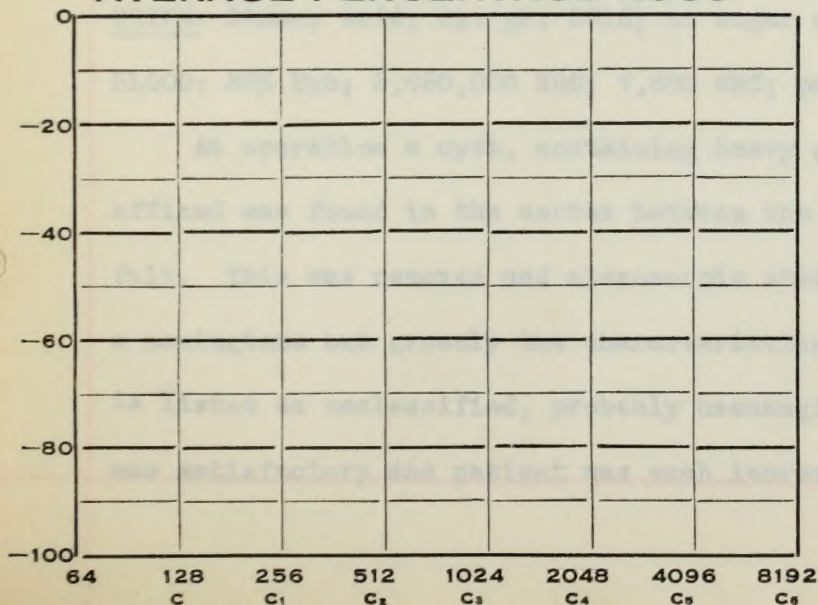
Wax

Upper Jaw

Lower Jaw

Wax

Voice

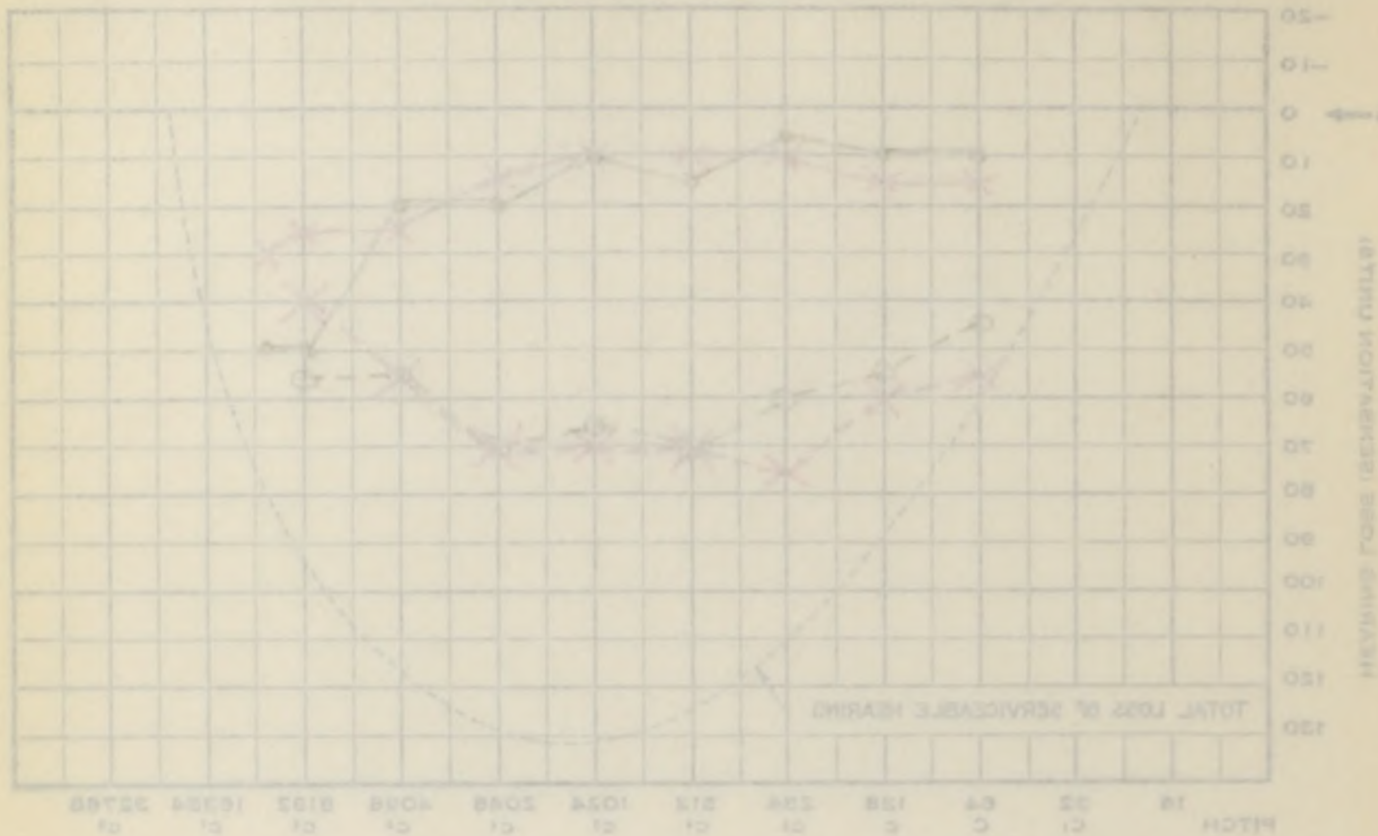
EVANS MEMORIAL**AUDIOGRAM**NAME D.O.S. 724295
DATE.....19.....**AVERAGE PERCENTAGE LOSS**

EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

P.O. 744292



EVANS MEMORIAL

D...O...S...; #724,295; Male; Age 26; White; Single.

DIAGNOSIS: Para-sagittal meningioma, right (questionable haemangioblastoma).

Fourteen months ago the patient reports that in a period of five weeks he had three "strokes" with resulting paresis of left arm and leg. He entered the neurological service where a study was made with a resulting diagnosis of probable multiple sclerosis. It was later found that the discs showed considerable choking and then the question of a brain tumor was put forward.

PHYSICAL EXAMINATION: The patient is well developed and well nourished. The teeth are in poor condition and the tonsils are enlarged. The neck is sore but not stiff. There is soreness of the left arm and leg and the head, with a tenderness to percussion over the right fronto-temporal region.

NEUROLOGICAL EXAMINATION: Test odors react more strongly on the right than on the left. There is a bilateral papilloedema and objects placed in the left hand are recognized only after a delay. There is nausea and vomiting. The left leg and arm are objectively weak with subjective diminution of pain and position sense. The reflexes of the left leg are increased with a variable Babinski and ankle and patellar clonus. The right pupil is larger than the left, both irregular but reacting well to light and accommodation.

LUMBAR PUNCTURE: I.P. 455; dynamics not checked; 80 cc. removed; F.P. 20.

URINE: Straw; acid; sp. gr. 1013; no sugar nor albumen.

BLOOD: 85% Hgb; 5,050,000 RBC; 7,800 WBC; pr. 112/84; Kahn negative.

At operation a cyst, containing heavy green fluid, with a mural tumor affixed was found in the cortex between the right lateral ventricle and the falx. This was removed and microscopic study showed the characteristics of a meningioma but grossly the characteristics were against this. The tumor is listed as unclassified, probably haemangioblastoma. Post operative course was satisfactory and patient was much improved at discharge.

D...S...; #724,285; Male; Age 38; White; Single.

DIAGNOSIS: Para-sagittal meningioma, right (questionable hemangioblastoma).

Fourteen months ago the patient reports that in a period of five weeks he had three "strokes" with resulting paresis of left arm and leg. He entered the neurological service where a study was made with a resulting diagnosis of probable multiple sclerosis. It was later found that the attack showed considerable choking and then the question of a brain tumor was put forward. PHYSICAL EXAMINATION: The patient is well developed and well nourished. The teeth are in poor condition and the tonsils are enlarged. The neck is sore but not stiff. There is soreness of the left arm and leg and the head, with a tenderness to percussion over the right fronto-temporal region.

NEUROLOGICAL EXAMINATION: Test odors react more strongly on the right than on the left. There is a bilateral papilloedema and objects placed in the left hand are recognized only after a delay. There is nausea and vomiting. The left leg and arm are objectively weak with subjective diminution of pain and position sense. The reflexes of the left leg are increased with a variable Babinski and ankle and patellar clonus. The right pupil is larger than the left, both irregular but reacting well to light and accommodation.

LUNG FUNCTION: I.P. 455; dynamics not checked; 80 cc. removed; F.V. 20.

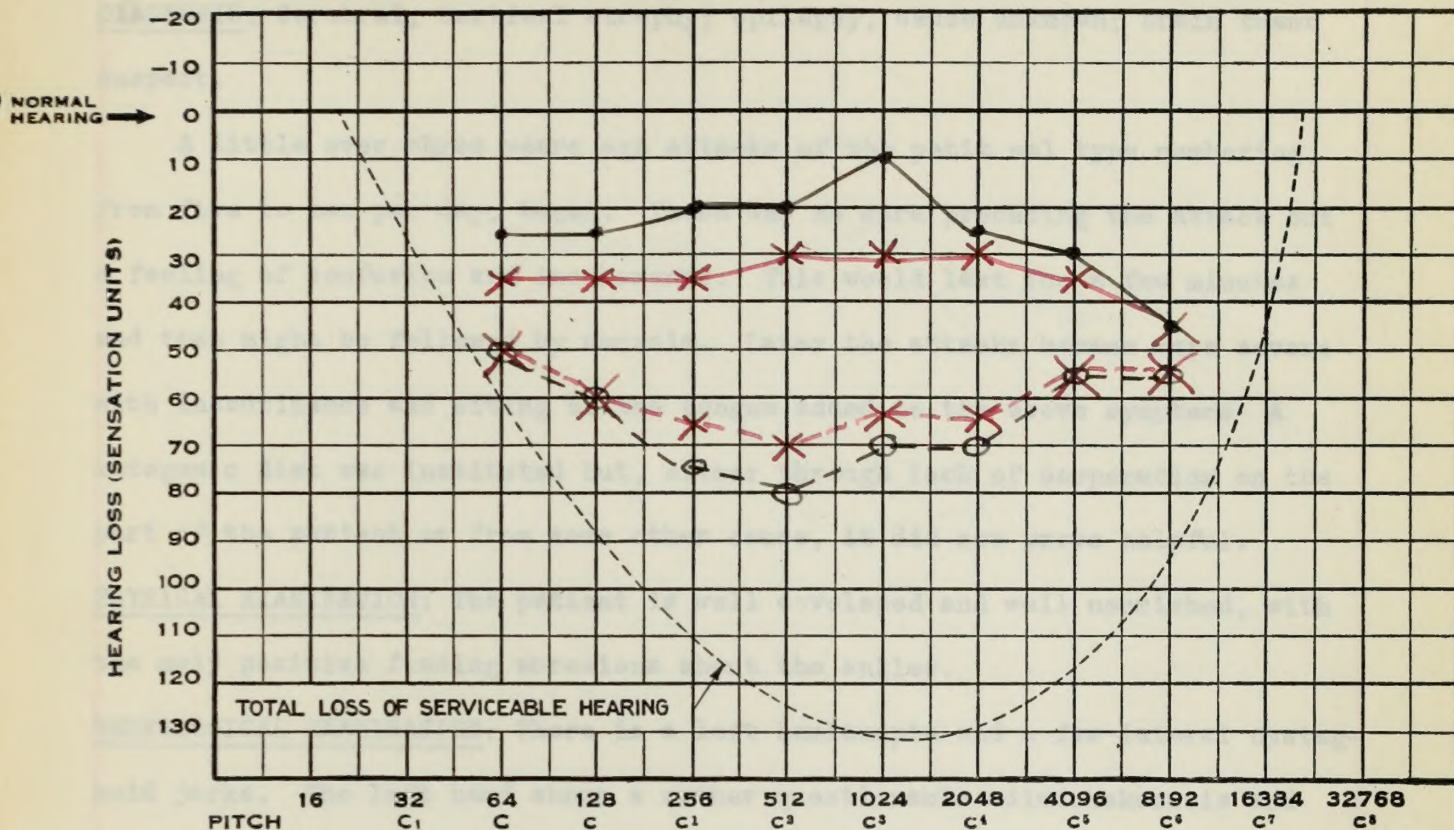
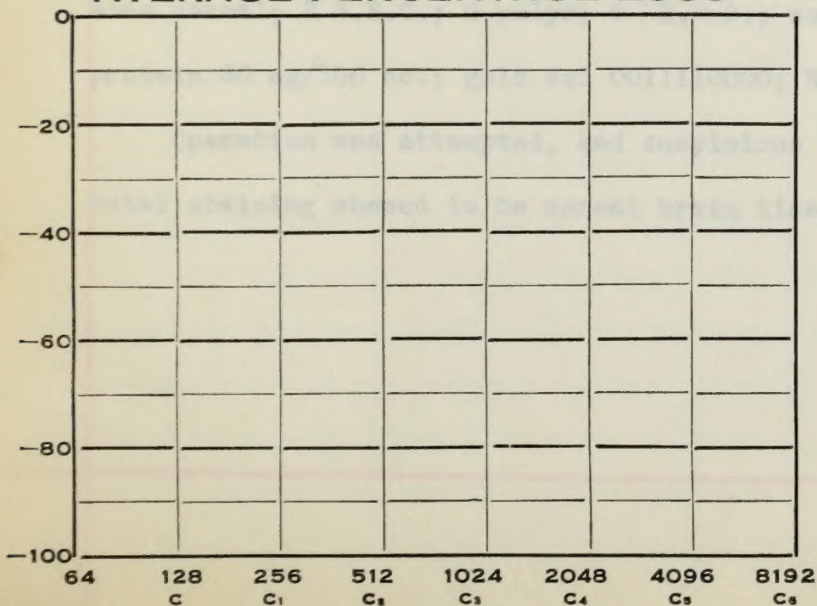
URINE: Straw; acid; sp. gr. 1.015; no sugar nor albumen.

BLOOD: 85% Hgb; 5,050,000 RBC; 7,800 WBC; gr. 112/34; Kahn negative.

At operation a cyst, containing heavy green fluid, with a mural tumor attached was found in the cortex between the right lateral ventricle and the falx. This was removed and microscopic study showed the characteristics of a meningioma but grossly the characteristics were against this. The tumor is listed as unclassified, probably hemangioblastoma. Post operative course was satisfactory and patient was much improved at discharge.

EVANS MEMORIAL**AUDIOGRAM**NAME M.C. 715307

DATE..... 19.....

**AVERAGE PERCENTAGE LOSS***Weber = at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness.....

2. Pain

3. Discharge.....

4. Tinnitus

5. Headache

6. Dizziness

Right..... Left..... Rinne ^{AC} _{BC}

..... Weber

..... Upper Limit.....

..... Lower Limit.....

..... Whisper.....

..... Voice.....

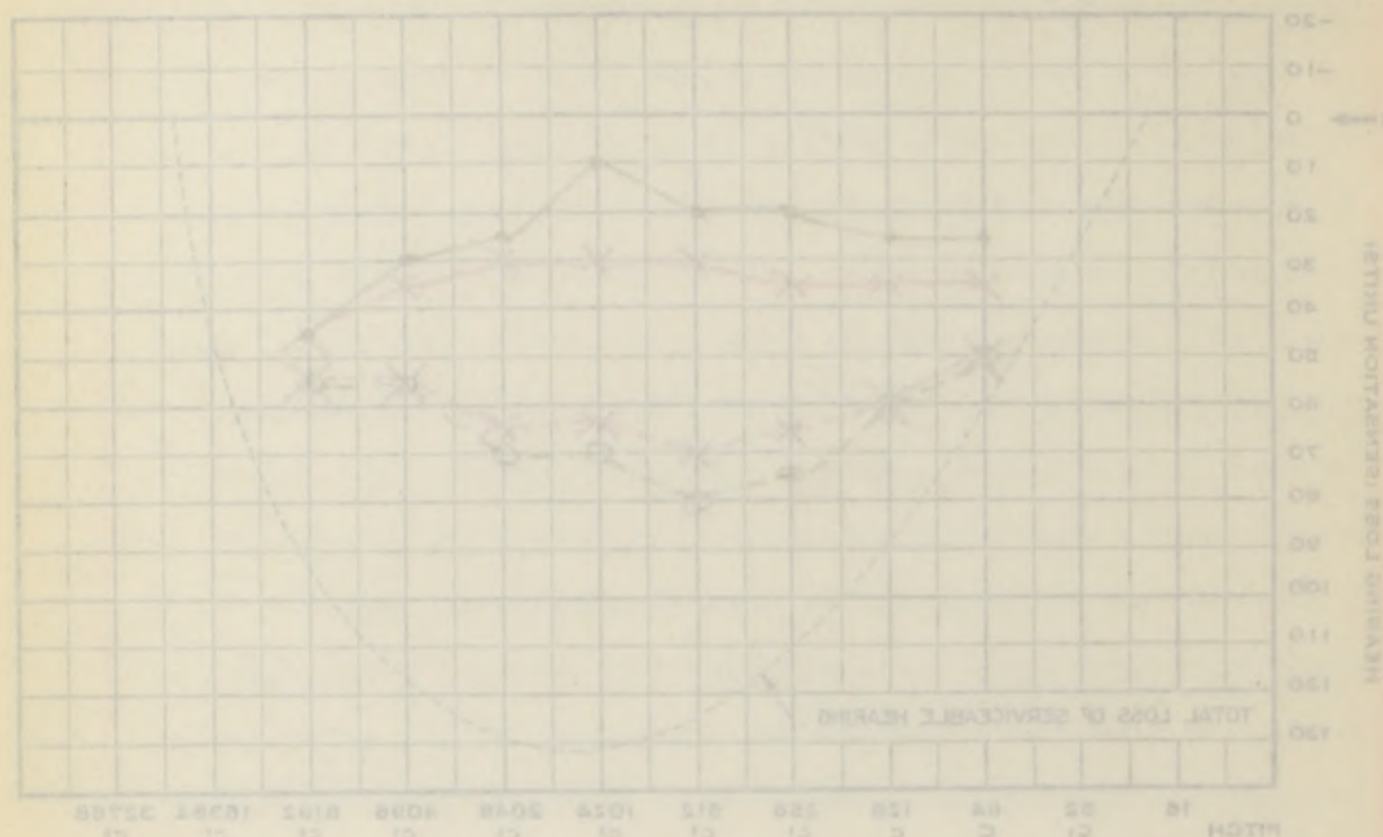
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

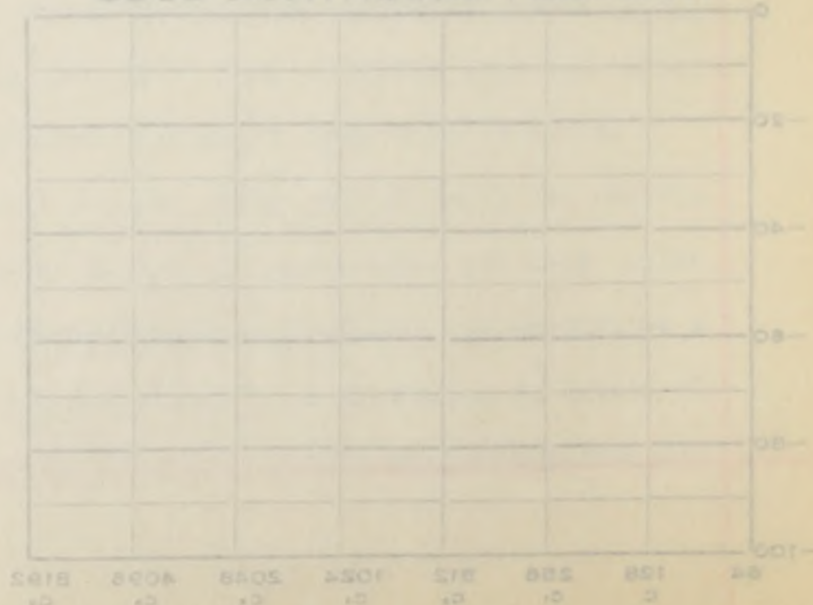
M.C.

712 307



Percentage Hearing Loss
Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Diagnosis
Dentition
Child Syndrome
1. Deafness
2. Late
3. Deafness
4. Deafness
5. Deafness
6. Deafness

Left

Right

Right Ear
Left Ear
Upper Limit
Lower Limit
Whisper
Voice

Webster at 412 307

M...C...; #715,307; Female; Age 21; White; Single.

DIAGNOSIS: Cerebral, certical atrophy; epilepsy, cause unknown; brain tumor suspect.

A little over three years ago attacks of the petit mal type numbering from five to ten per day, began. There was no aura preceding the attack but a feeling of confusion and incoherence. This would last for a few minutes and then might be followed by amnesia. Later the attacks became more severe with incontinence and biting of the tongue added to the above symptoms. A ketogenic diet was instituted but, either through lack of cooperation on the part of the patient or from some other cause, it did not prove helpful.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, with the only positive finding abrasions about the ankles.

NEUROLOGICAL EXAMINATION: There is a left hemianopia and a few lateral nystagmoid jerks. The left hand shows a rather questionable adiadokokinesis and the left knee jerk is absent. The pupils react poorly to accomodation.

X-ray studies of the head were negative.

URINE: Yellow; acid; sp. gr. 1020; no sugar nor albumen.

BLOOD: 80% Hgb.; 4,910,000 R.B.C.; 8,600 W.B.C.; Kahn negative; pr. 114/74.

LUMBAR PUNCTURE: I.P. 170; dynamics normal; 10 cc. removed; F.P. 110; appearance normal; 2 W.B.C.; 0 polys; 0 R.B.C.; negative Ross-Jones and Pandy; protein 30 mg/100 cc.; gold sol 0011110000; Wasserman negative.

Operation was attempted, and suspicious looking material found which vital staining showed to be normal brain tissue with gliosis.

M...G...: 4715, 507; Female; Age 21; White; Single.

DIAGNOSIS: Cerebral, cortical atrophy; epilepsy, cause unknown; brain tumor

suspect.

A little over three years ago attacks of the petit mal type numbering from five to ten per day, began. There was no aura preceding the attack but a feeling of confusion and incoherence. This would last for a few minutes and then might be followed by amnesia. Later the attacks became more severe with incontinence and biting of the tongue added to the above symptoms. A ketogenic diet was instituted but, either through lack of cooperation on the part of the patient or from some other cause, it did not prove helpful.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, with

the only positive finding spasticity about the ankles.

NEUROLOGICAL EXAMINATION: There is a left homonymous and a few lateral system-

ic jerks. The left hand shows a rather questionable adiadochokinesis and

the left knee jerk is absent. The pupils react poorly to accommodation.

X-ray studies of the head were negative.

URINE: Yellow; acid; sp. gr. 1.020; no sugar nor albumen.

BLOOD: Hem. 4,810,000 R.B.C.; 8,800 W.B.C.; Kahn negative; pr. 114/76.

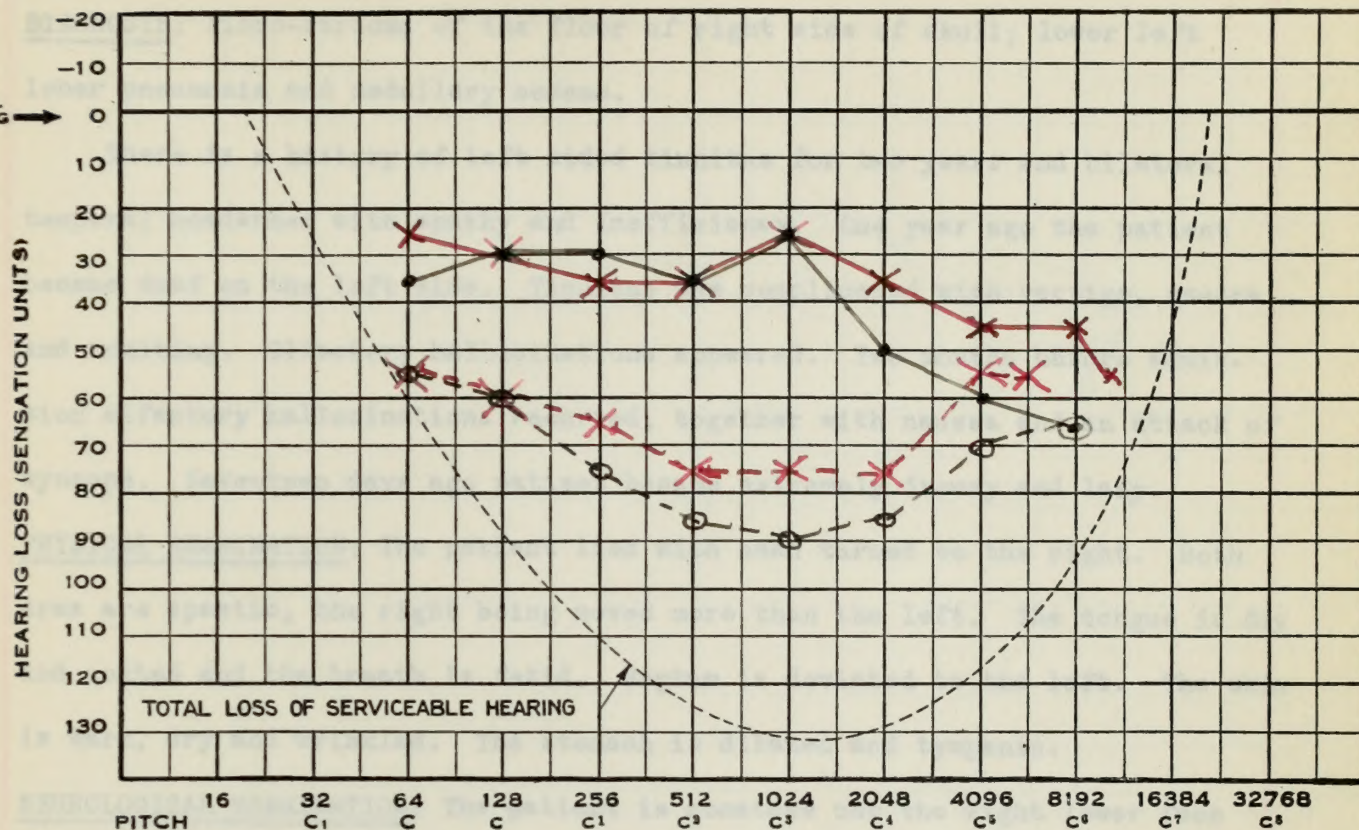
SKELETAL STRUCTURE: I.P. 170; dynamics normal; 10 cc. removed; P.R. 110; appear-

ance normal; E.A.C.; 0 poly; 0 H.B.C.; negative Ross-Jones and Pandey;

protein 30 mg/100 cc.; solid sol 0.01110000; Wasserman negative.

Operation was attempted, and suspicious looking material found which

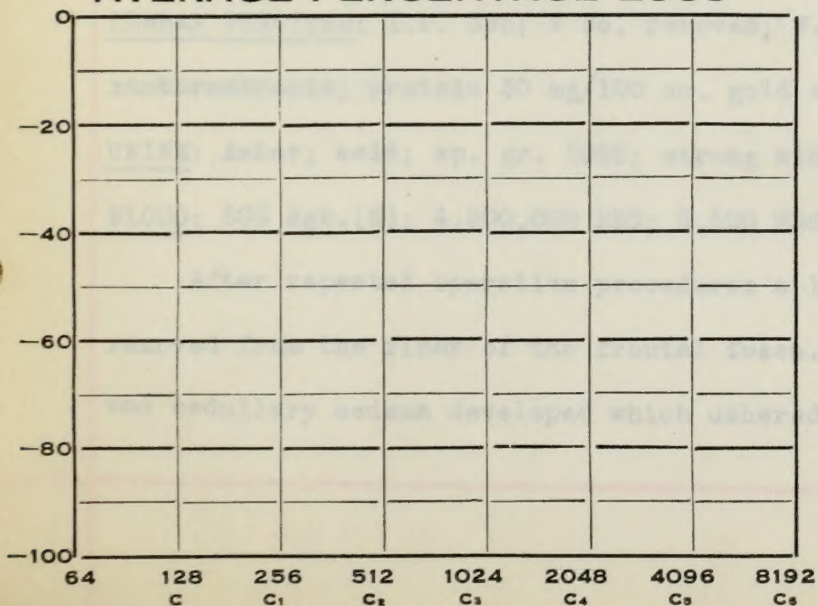
vital staining showed to be normal brain tissue with gliosis.

EVANS MEMORIAL**AUDIOGRAM**NAME M.C. 731039
DATE.....19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber = at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

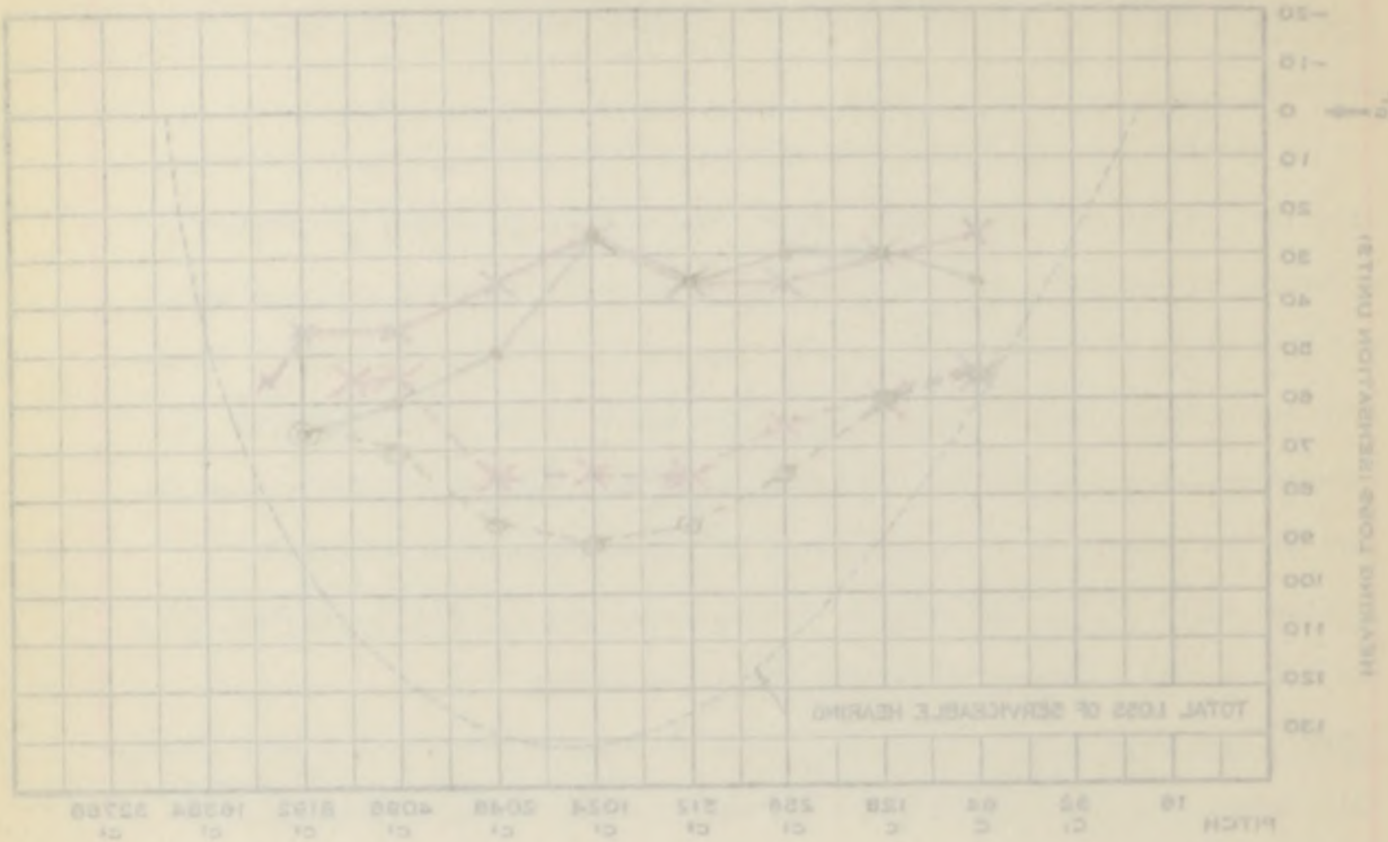
Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

M.C. 731032



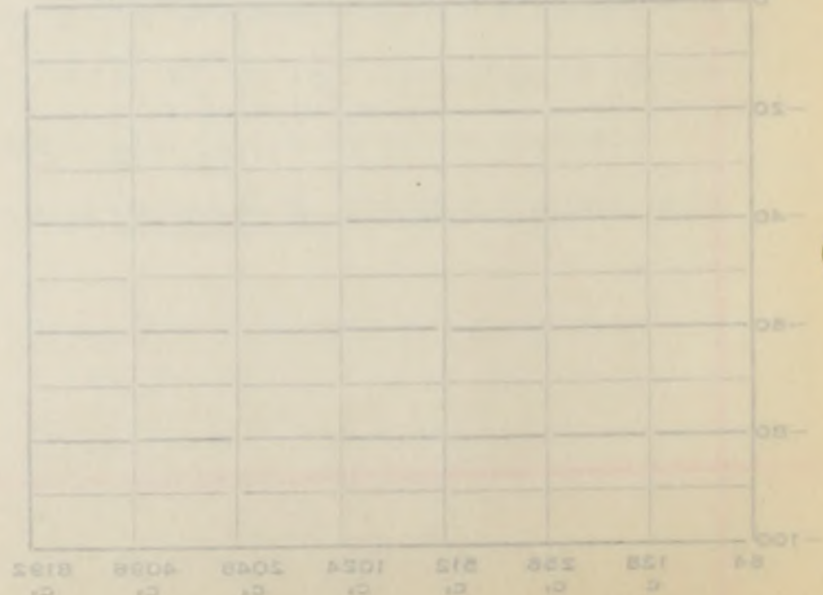
Percentage Hearing Loss

Right Ear

Left Ear

Wedge = 44 Points

AVERAGE PERCENTAGE LOSS



- Chief Complaint
1. Deafness
 2. Pain
 3. Discharge
 4. Tinnitus
 5. Headache
 6. Dizziness

Right

Left

Wedge

Upper Limit

Lower Limit

Whisper

Voice

M...C...; #731,039; Female; Age 42; White; Married.

DIAGNOSIS: Fibro-sarcoma of the floor of right side of skull; lower left lobar pneumonia and medullary oedema.

There is a history of left sided tinnitus for two years and bilateral temporal headaches with apathy and inefficiency. One year ago the patient became deaf on the left side. Tinnitus was complicated with vertigo, nausea, and vomiting. Olfactory hallucinations appeared. Two months before admission olfactory hallucinations recurred, together with nausea and an attack of syncope. Seventeen days ago patient became extremely drowsy and lazy.

PHYSICAL EXAMINATION: The patient lies with head turned to the right. Both arms are spastic, the right being moved more than the left. The tongue is dry and coated and the breath is fetid. Septum is deviated to the left. The skin is warm, dry and wrinkled. The stomach is dilated and tympanic.

NEUROLOGICAL EXAMINATION: The patient is comatose but the right lower face contracts more than the left to painful stimuli. The jaws sag open. There is incontinence of both urine and feces. There is tremor and ataxia of both arms with the reflexes greater on the right. The left arm and leg move less throughout, although there is bilateral spontaneous ankle clonus. There is no sweating or flushing although the extremities seem quite warm.

LUMBAR PUNCTURE: I.P. 395; 9 cc. removed; F.P. 190; appearance turbid, xanthochromic; protein 30 mg/100 cc. gold sol 0001221000.

URINE: Amber; acid; sp. gr. 1035; strong albumen reaction; few W. B. C.

BLOOD: 80% Hgb.(S); 4,800,000 RBC; 8,600 WBC; Kahn negative; pr.154/98.

After repeated operative procedures a large fibro-sarcoma was partially removed from the floor of the frontal fossa. A post-operative pneumonia and medullary oedema developed which ushered in the end shortly thereafter.

M...C...; 4531,038; Female; Age 42; White; Married.

DIAGNOSIS: Fibro-sarcoma of the floor of right side of skull; lower left

lobar pneumonia and mediastinal adenoma.

There is a history of left sided tingling for two years and bilateral

temporal headaches with apathy and inefficiency. One year ago the patient

became deaf on the left side. Tingling was complicated with vertigo, nausea

and vomiting. Olfactory hallucinations appeared. Two months before admis-

sion olfactory hallucinations recurred, together with nausea and an attack of

syncope. Seventeen days ago patient became extremely drowsy and lassy.

PHYSICAL EXAMINATION: The patient lies with head turned to the right. Both

arms are apathetic, the right being moved more than the left. The tongue is dry

and coated and the breath is fetid. Spleen is deviated to the left. The skin

is warm, dry and wrinkled. The stomach is dilated and tympanic.

NEUROLOGICAL EXAMINATION: The patient is comatose but the right lower face

contracts more than the left to painful stimuli. The jaw are open. There

is incontinence of both urine and feces. There is tremor and ataxia of both

arms with the reflexes greater on the right. The left arm and leg move less

throughout, although there is bilateral spontaneous ankle clonus. There is

no sweating or flushing although the extremities seem quite warm.

LABORATORY FINDINGS: I.P. 385; 9 cc. removed; E.P. 180; appearance turbid,

xanthochromic; protein 30 mg/100 cc. Gold and 0001231000.

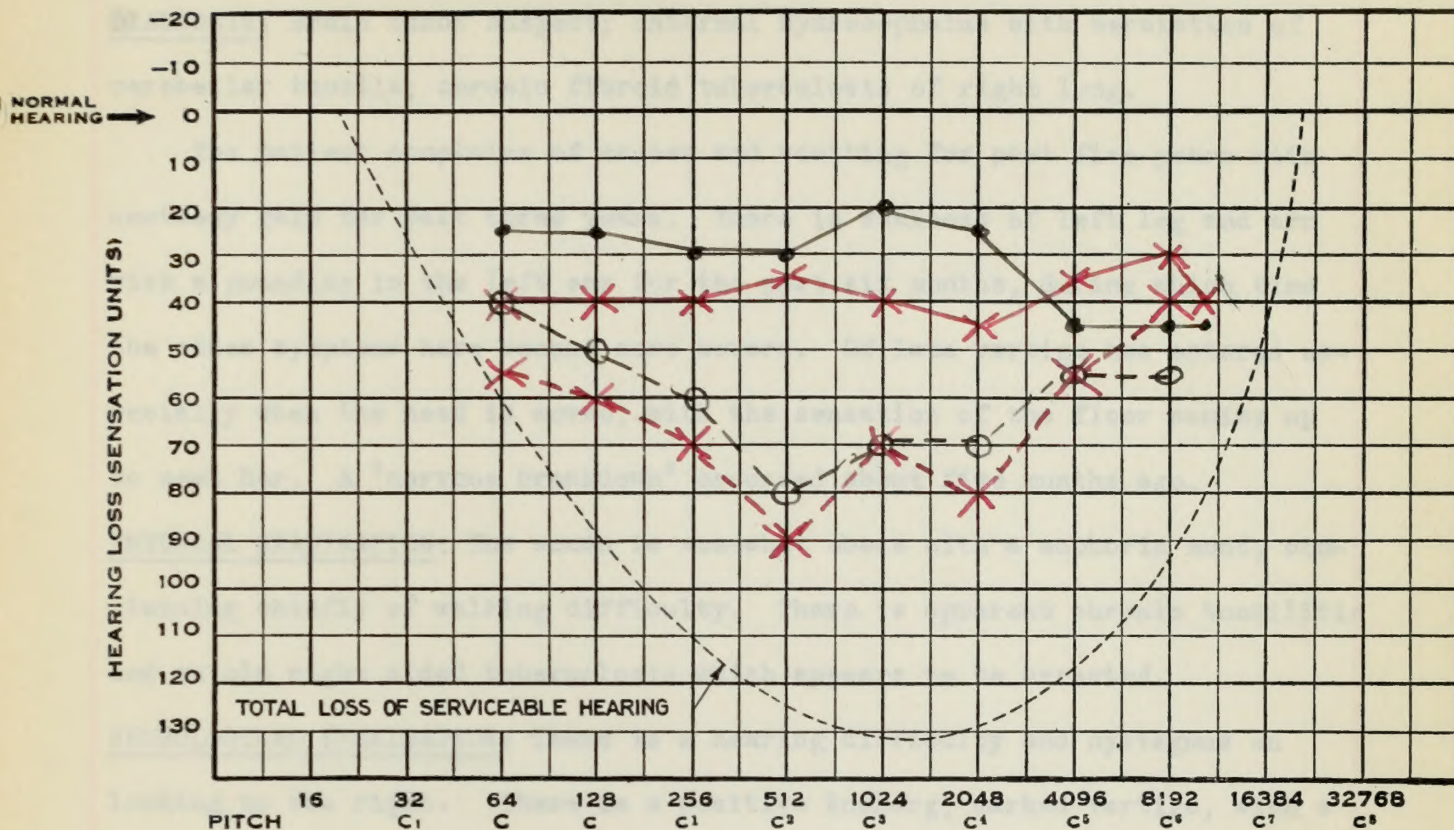
URINE: Amber; acid; sp. gr. 1.035; strong albumen reaction; few W. B. C.

BLOOD: 805 Hgb. (2); 4,800,000 RBC; 8,600 WBC; Kahn negative; pr. 134/78.

After repeated operative procedures a large fibro-sarcoma was partially

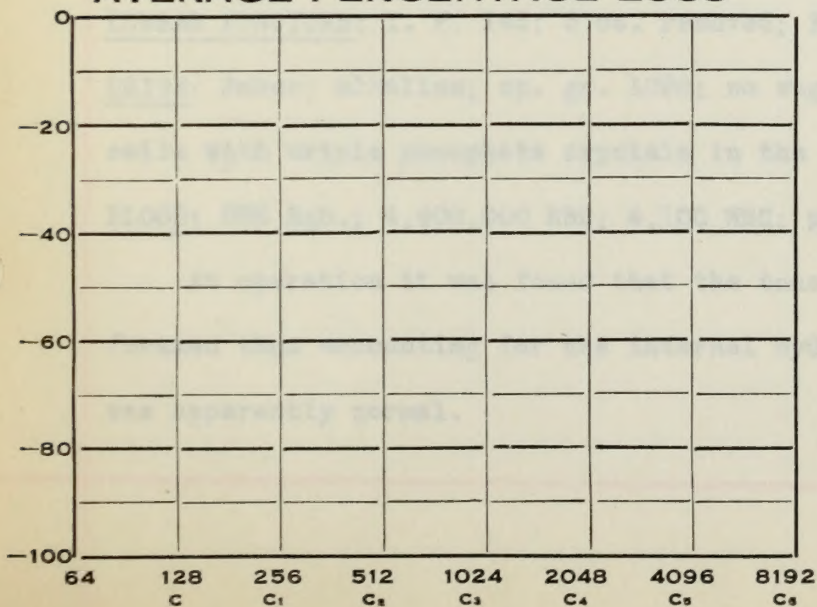
removed from the floor of the frontal fossa. A post-operative pneumonia

and mediastinal adenoma developed which ushered in the end shortly thereafter.

EVANS MEMORIAL**AUDIOGRAM**NAME J. G. 727461
DATE 19.....

Percentage Hearing Loss

Right Ear
 Left Ear

*Weber Right at 4 Points***AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

Rinne $\frac{AC}{BC}$

Weber

Upper Limit

Lower Limit

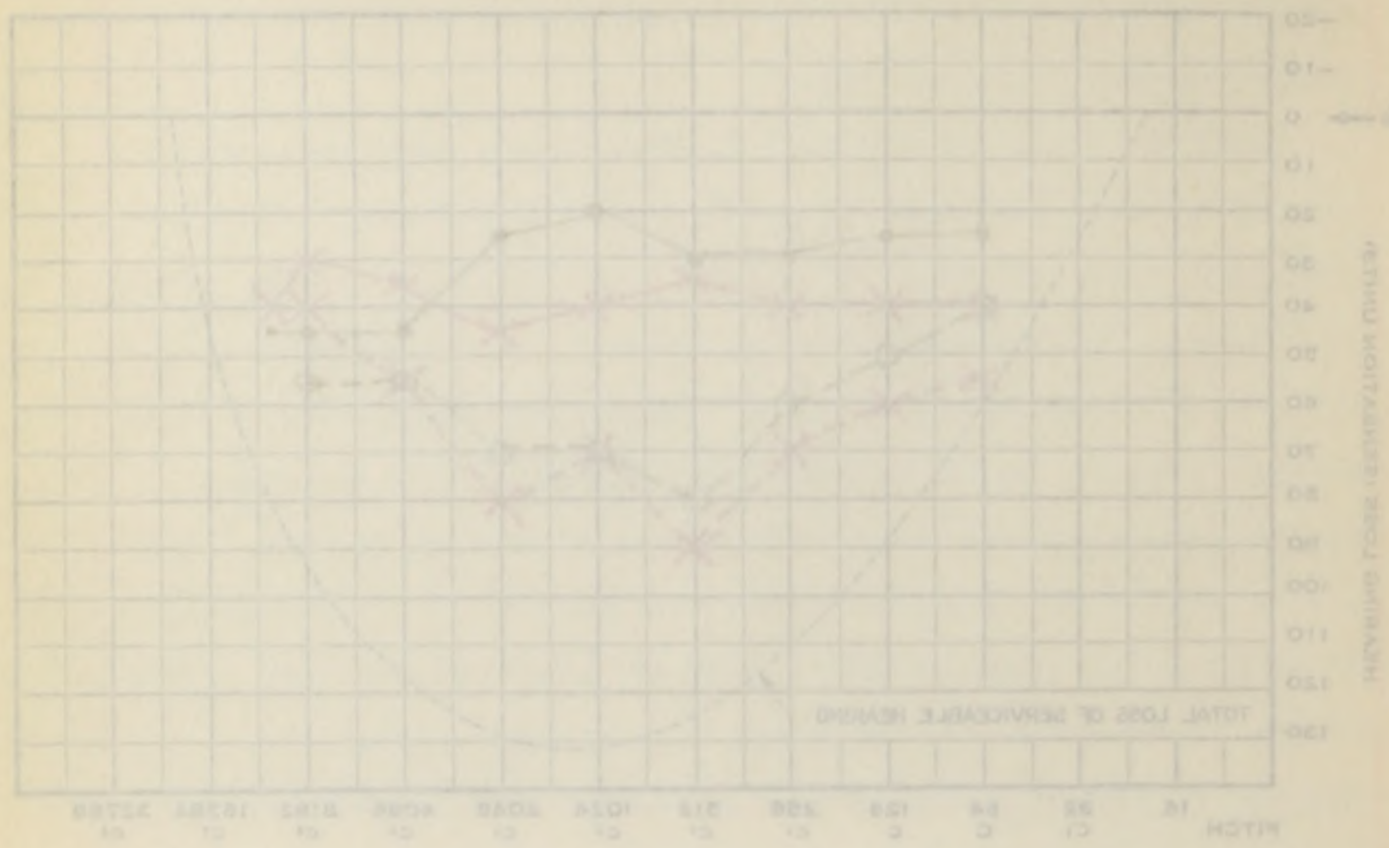
Whisper

Voice

EYAN'S MEMORIAL

AUDIOGRAM

NAME J. G. 724461
DATE 19



J...G...; #724,461; Female; Age 50; White; Married.

DIAGNOSIS: Brain tumor suspect; internal hydrocephalus with herniation of cerebellar tonsils; chronic fibroid tuberculosis of right lung.

The patient complains of nausea and vomiting for past five years with unsteady gait for past three years. There is weakness of left leg and arm with a pounding in the left ear for the past six months, during which time the other symptoms have become more severe. Of late vertigo has entered especially when the head is moved, with the sensation of the floor coming up to meet her. A "nervous breakdown" occurred about five months ago.

PHYSICAL EXAMINATION: The woman is somewhat obese with a euphoric mood, complaining chiefly of walking difficulty. There is apparent chronic tonsillitis and an old right sided tuberculosis which appears to be arrested.

NEUROLOGICAL EXAMINATION: There is a hearing difficulty and nystagmus on looking to the right. There is a positive Romberg, marked vertigo, with a poor posture and gait and a tendency to fall to the left and forward. The left arm is asynergic, with apparent diminished strength. The reflexes are generally more active on the right, with a right sided Chaddock but no Babinski. The discs show a possible papilloedema but no choking is measurable. Caloric tests show no impairment of the vestibular apparatus.

LUMBAR PUNCTURE: I. P. 145; 3 cc. removed; F.P. 105.

URINE: Amber; alkaline; sp. gr. 1020; no sugar nor albumen; occasional pus cells with triple phosphate crystals in the sediment.

BLOOD: 85% Hgb.; 4,400,000 RBC; 4,100 WBC; pr. 137/117; Kahn negative.

At operation it was found that the tonsils were herniated through the foramen thus accounting for the internal hydrocephalus. Everything else was apparently normal.

J...G...; 5724,481; Female; Age 50; White; Married.

DIAGNOSIS: Brain tumor suspect; internal hydrocephalus with herniation of cerebellar tonsils; chronic fibroid tuberculosis of right lung.

The patient complains of nausea and vomiting for past five years with unsteady gait for past three years. There is weakness of left leg and arm with a pounding in the left ear for the past six months, during which time the other symptoms have become more severe. Of late vertigo has entered especially when the head is moved, with the sensation of the floor coming up to meet her. A "nervous breakdown" occurred about five months ago.

PHYSICAL EXAMINATION: The woman is somewhat obese with a euphoric mood, complaining chiefly of walking difficulty. There is apparent chronic tonsillitis and an old right sided tuberculous which appears to be arrested.

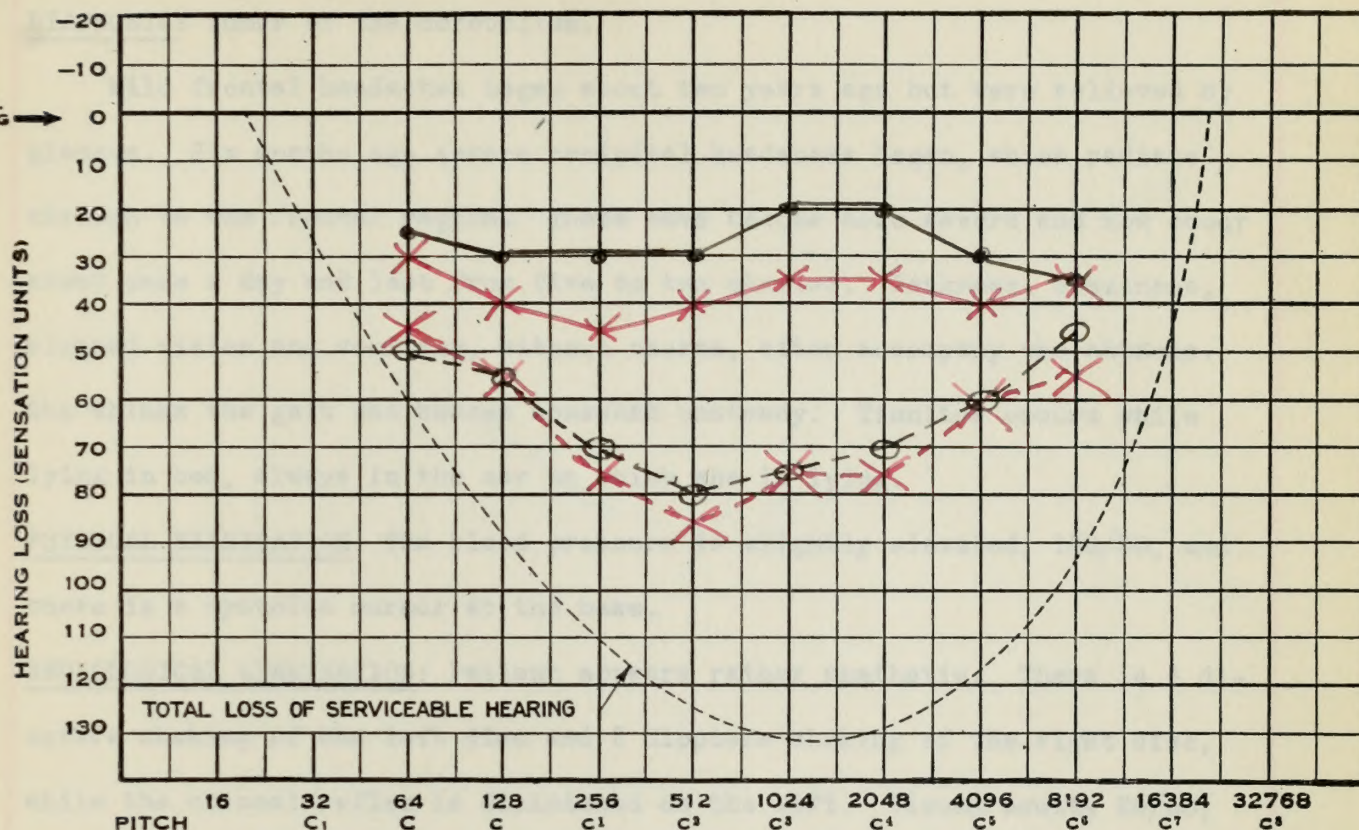
NEUROLOGICAL EXAMINATION: There is a hearing difficulty and nystagmus on looking to the right. There is a positive Romberg, marked vertigo, with a poor posture and gait and a tendency to fall to the left and forward. The left arm is synergistic, with apparent diminished strength. The reflexes are generally more active on the right, with a right sided Chaddock but no Babinski. The discs show a possible papilloedema but no choking is demonstrable. Caloric tests show no impairment of the vestibular apparatus.

LABORATORY FINDINGS: I. E. 145; 3 cc. removed; P.P. 105.

URINE: Acid; alkaline; sp. gr. 1020; no sugar nor albumen; occasional pus cells with triple phosphate crystals in the sediment.

BLOOD: 884 Rbc.; 4,400,000 Rbc.; 4,100 Wbc.; pr. 137/117; Kahn negative.

At operation it was found that the tonsils were herniated through the foramen thus accounting for the internal hydrocephalus. Everything else was apparently normal.

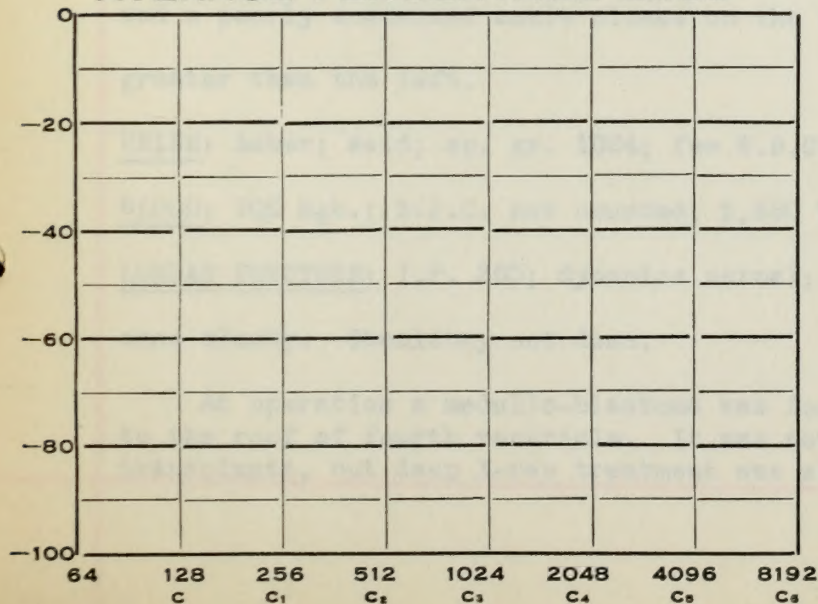
EVANS MEMORIAL**AUDIOGRAM**NAME A.P. 708690
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

Weber = at 4 Points

AVERAGE PERCENTAGE LOSS

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit

Lower Limit

Whisper

Voice

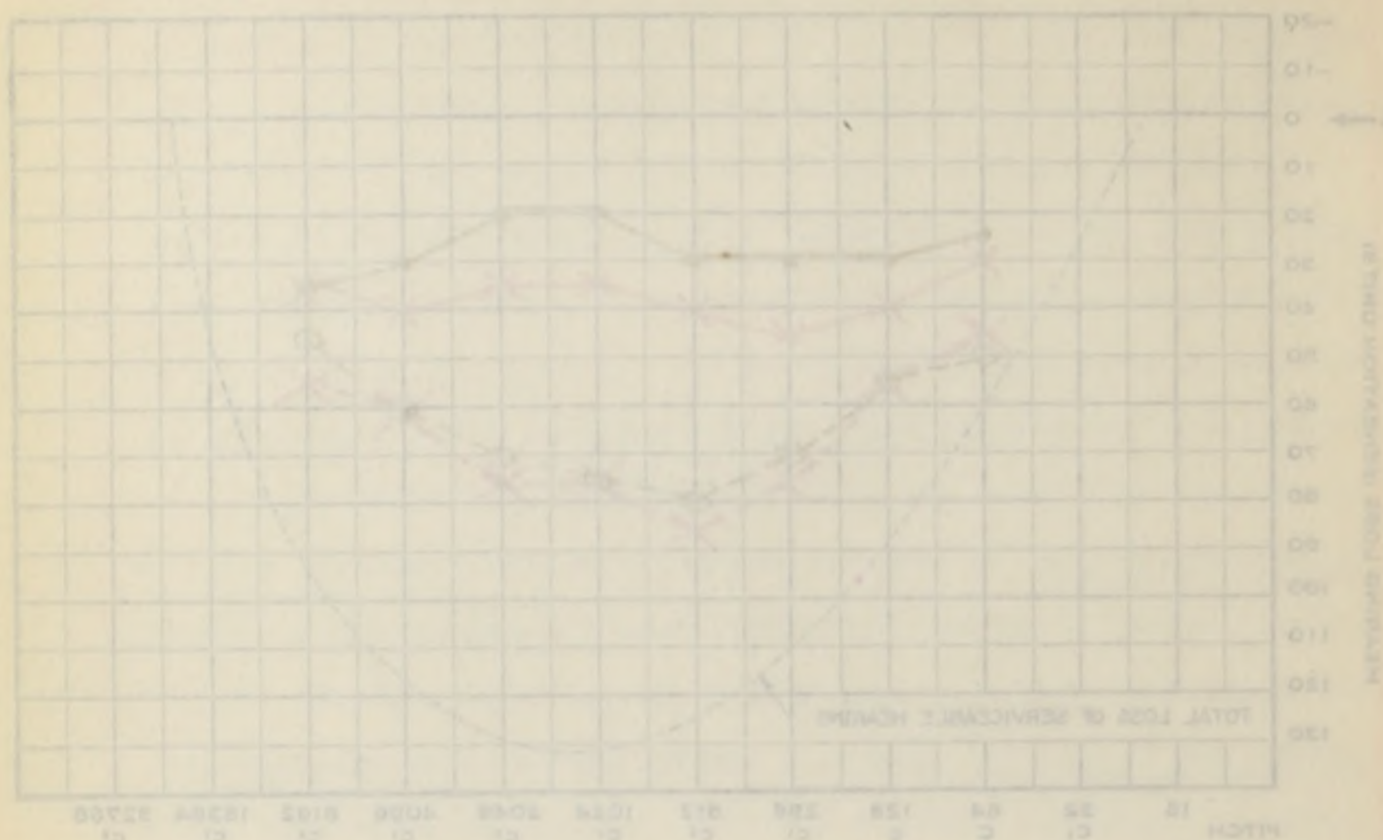
EVANS MEMORIAL

705690

A.Y.

NAME
DATE

AUDIOGRAM

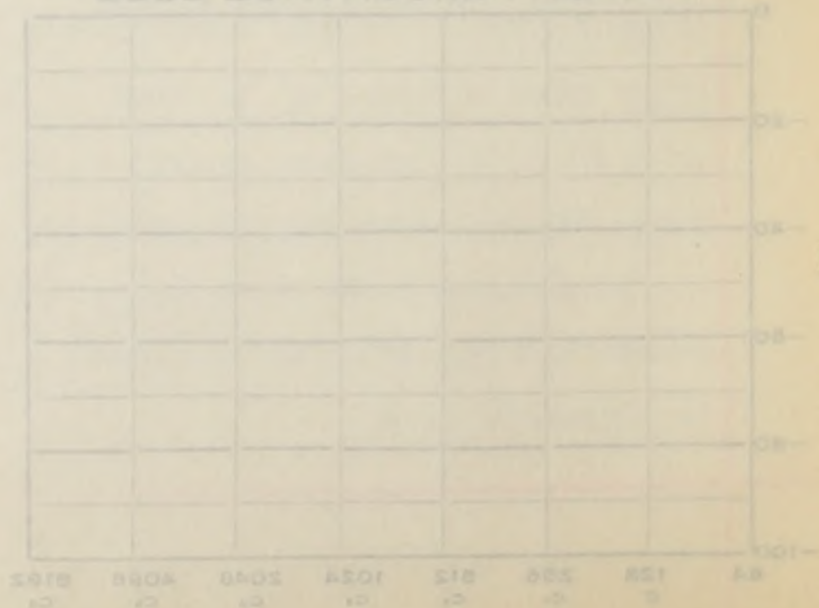


Frequency (Hz)

Hearing Level (dB)

Weber = at 4 points

AVERAGE PERCENTAGE LOSS



Left Ear

Right Ear

Frequency (Hz)

Average Percentage Loss

125

250

500

1000

2000

4000

8000

0

10

20

30

40

50

60

70

80

90

100

EVANS MEMORIAL

A... P...; #708,690; Female; Age 19; White; Single.

DIAGNOSIS: Tumor of the cerebellum.

Mild frontal headaches began about two years ago but were relieved by glasses. Six months ago severe occipital headaches began, which radiate through to the frontal region. These have become more severe and now occur about once a day and last from five to ten minutes. Weakness, dizziness, blurred vision and vomiting, without nausea, often accompany the attacks. She thinks the gait has become somewhat unsteady. Tinnitus occurs while lying in bed, always in the ear on which she is lying.

PHYSICAL EXAMINATION: The blood pressure is slightly elevated, 150/80, and there is a systolic murmur at the base.

NEUROLOGICAL EXAMINATION: Patient appears rather apathetic. There is 4 diopters choking of the left disc and 2 diopters choking of the right disc, while the corneal reflex is diminished on the left. Visual acuity 20/50; ten days later 20/100 bilaterally. There is lateral nystagmus and the gag reflex is absent. Nasal labial fold less marked on the left and slightly less emotional expression on that side. There is past pointing and overshooting with the left hand, while the right hand is unsteady and shows slight cerebellar rebound. The gait is unsteady, with a positive Romberg and a poorly sustained ankle clonus on the right, with the right ankle jerk greater than the left.

URINE: Amber; acid; sp. gr. 1024; few W.B.C. and epithelial cells in sediment.

BLOOD: 70% Hgb.; R.B.C. not counted; 5,450 W.B.C.; Kahn negative; pr. 150/80.

LUMBAR PUNCTURE: I.P. 280; dynamics normal; 15 cc. removed; F.P. 160; appearance bloody. Chemistry not done.

At operation a medullo-blastoma was found in the medline which extended to the roof of fourth ventricle. It was not removed due to the danger of transplants, but deep X-ray treatment was started immediately after operation.

A... F...; 5708, 580; Female; Age 19; White; Single.

DIAGNOSIS: Tumor of the cerebellum.

Mild frontal headaches began about two years ago but were relieved by glasses. Six months ago severe occipital headaches began, which radiate through to the frontal region. These have become more severe and now occur about once a day and last from five to ten minutes. Headaches, dizziness, blurred vision and vomiting, without nausea, often accompany the attacks. She thinks the gait has become somewhat unsteady. Flushing occurs while lying in bed, always in the ear on which she is lying.

PHYSICAL EXAMINATION: The blood pressure is slightly elevated, 150/80, and

there is a systolic murmur at the base.

NEUROLOGICAL EXAMINATION: Patient appears rather apathetic. There is a di-

fferent checking of the left side and 2 diaphragms showing of the right side, while the corneal reflex is diminished on the left. Visual acuity 20/50; ten days later 20/100 bilaterally. There is lateral nystagmus and the gag reflex is absent. Nasal labial fold less marked on the left and slightly less emotional expression on that side. There is past pointing and overshooting with the left hand, while the right hand is unsteady and shows slight cerebellar rebound. The gait is unsteady, with a positive Romberg and a poorly sustained ankle pronus on the right, with the right ankle jerk greater than the left.

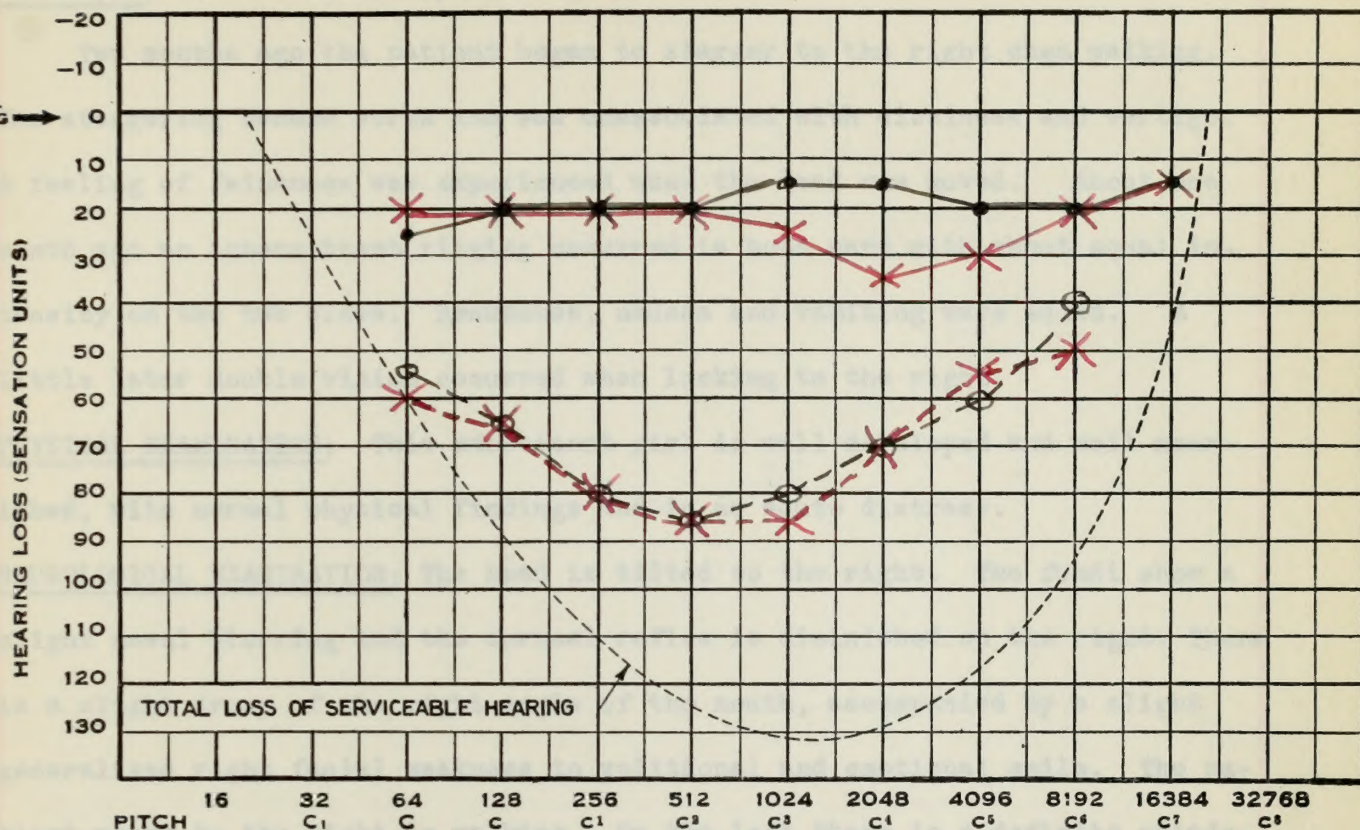
URINE: Amber; acid; sp. gr. 1024; few W.B.C. and epithelial cells in sediment.

BLOOD: 70% Hgb.; R.B.C. not counted; 5,450 W.B.C.; Kahn negative; pr. 150/80.

RENAL FUNCTION: I.P. 280; dynamics normal; 15 cc. removed; F.P. 180; appear-

ance bloody. Chemistry not done.

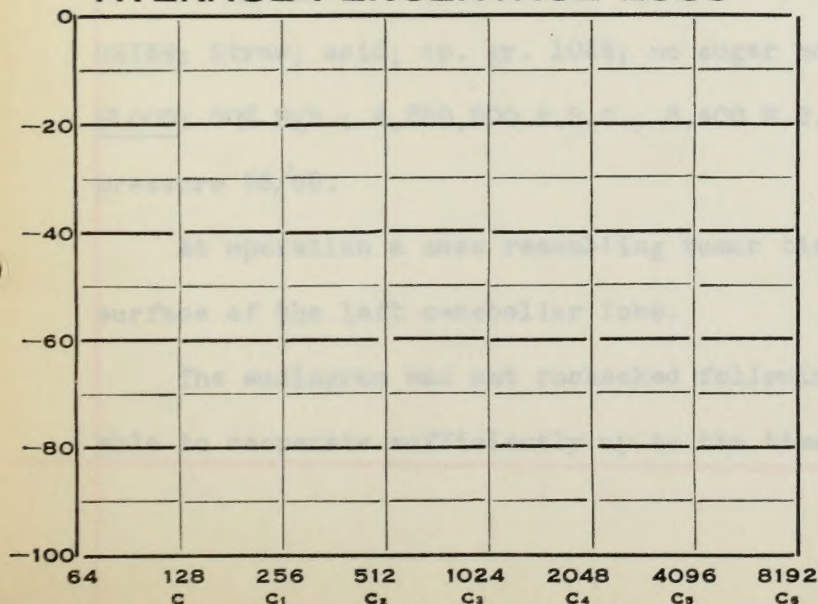
At operation a medullo-blastoma was found in the medulla which extended to the roof of fourth ventricle. It was not removed due to the danger of transplants, but deep X-ray treatment was started immediately after operation.

EVANS MEMORIAL**AUDIOGRAM**NAME M.E.S. 740257
DATE.....19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber = at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

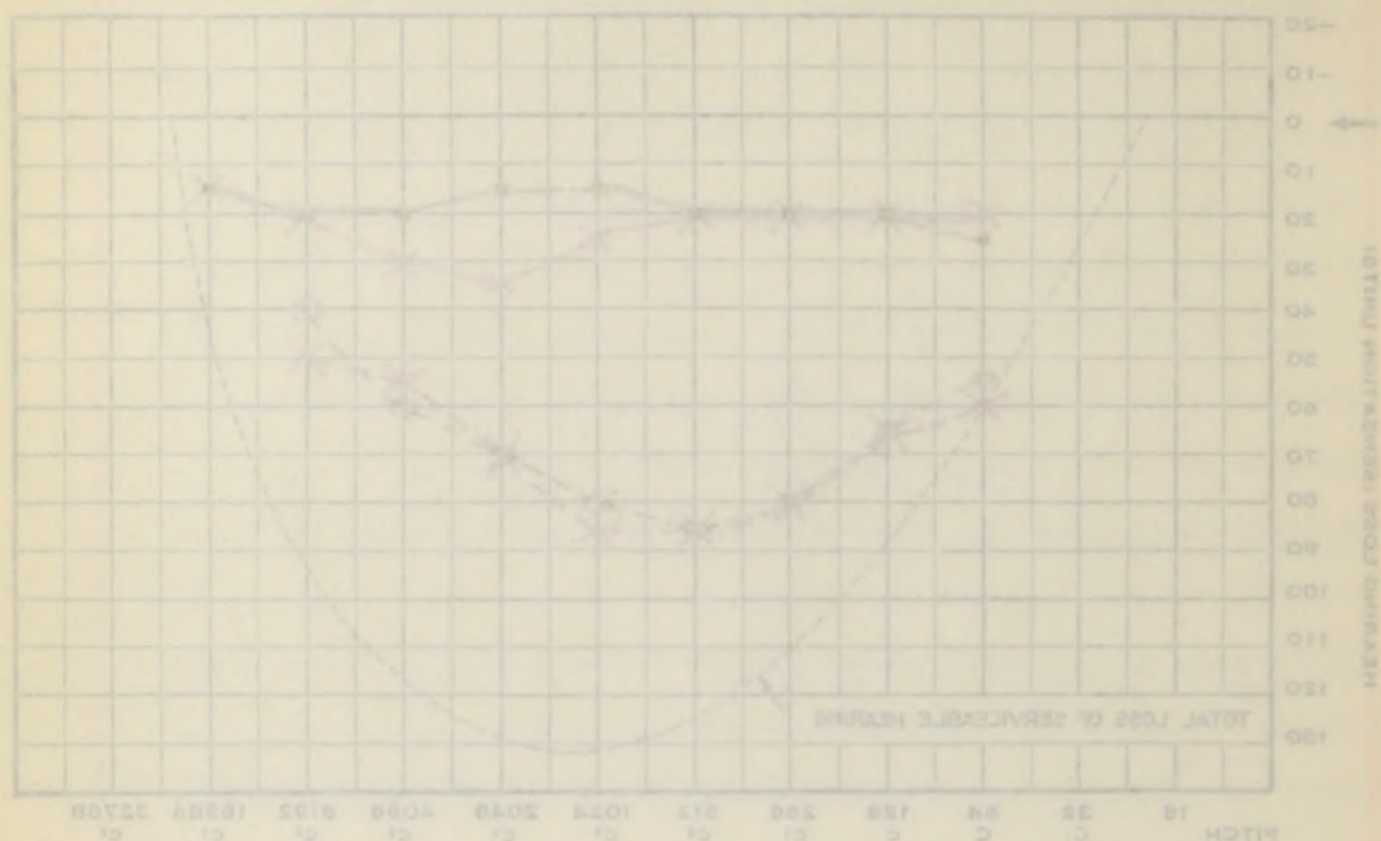
AUDIOGRAM

NAME

M.E.S. 740227

DATE

18

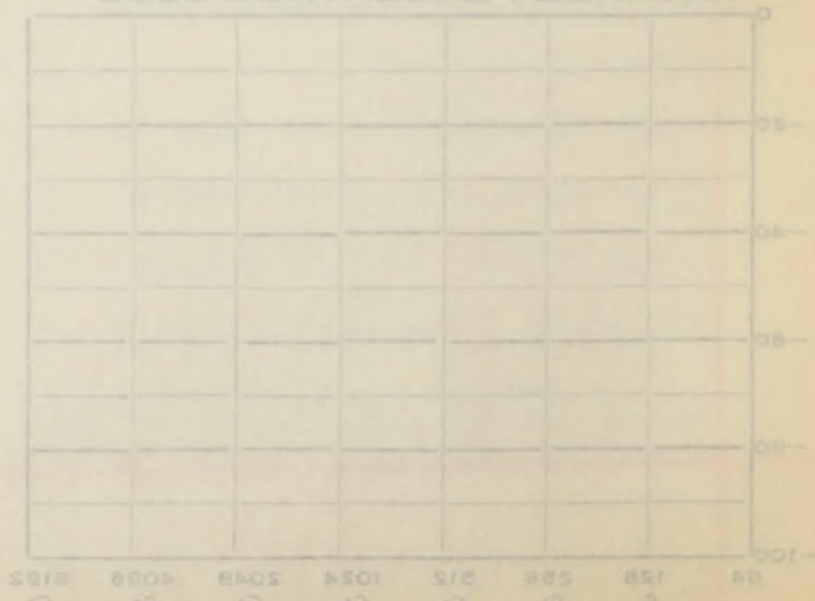


Frequency Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber - at 4 Points

Distance

Distance

Chief Symptom

1. Tinnitus

2. Pain

3. Deafness

4. Vertigo

5. Headache

6. Dizziness

Right

Left

Distance

Distance

Upper Limit

Lower Limit

Upper Limit

Lower Limit

Upper Limit

Lower Limit

M.E.S. #740,257; Female; Age 13; White; Single.

DIAGNOSIS: Brain tumor suspect.

Two months ago the patient began to stagger to the right when walking. The staggering became worse and was unassociated with dizziness and vertigo. A feeling of faintness was experienced when the head was moved. About one month ago an intermittent ringing occurred in both ears with about equal intensity on the two sides. Headaches, nausea and vomiting were added. A little later double vision occurred when looking to the right.

PHYSICAL EXAMINATION: This adolescent girl is well developed and well nourished, with normal physical findings and in no acute distress.

NEUROLOGICAL EXAMINATION: The head is tilted to the right. The fundi show a slight nasal blurring and the corneal reflex is diminished on the right. There is a slight droop of the right angle of the mouth, accompanied by a slight generalized right facial weakness to volitional and emotional smile. The patient veers to the right in walking. On the left there is a definite adiado-kokonesia with clumsiness in the execution of fine movements. The left knee and ankle jerk are more spastic than the right, with definite Oppenheim and Babinski on the left. A sinus arrhythmia is present.

LUMBAR PUNCTURE: I.P. 190; dynamics normal; 18 cc. removed; F.P. 160; 2 RBC; protein 32 mg/100 cc.; gold sol 00011000000 Wasserman negative.

URINE: Straw; acid; sp. gr. 1025; no sugar nor albumen.

BLOOD: 80% Hgb.; 4,250,000 R.B.C.; 8,400 W.B.C.; N.P.N. 18; B.S. 62; pressure 95/65.

At operation a mass resembling tumor tissue was encountered beneath the surface of the left cerebellar lobe.

The audiogram was not rechecked following operation as patient was unable to cooperate sufficiently up to the time of discharge.

M.R.S. 4940, 287; Female; Age 18; White; Single.

DIAGNOSIS: Brain tumor suspect.

Two months ago the patient began to stagger to the right when walking. The staggering became worse and was unassociated with dizziness and vertigo. A feeling of faintness was experienced when the head was moved. About one month ago an intermittent ringing occurred in both ears with about equal intensity on the two sides. Headaches, nausea and vomiting were added. A

little later double vision occurred when looking to the right.

PHYSICAL EXAMINATION: This adolescent girl is well developed and well nourished, with normal physical findings and no acute distress.

NEUROLOGICAL EXAMINATION: The head is tilted to the right. The fundi show a slight nasal blurring and the corneal reflex is diminished on the right. There is a slight droop of the right angle of the mouth, accompanied by a slight generalized right facial weakness to volitional and emotional smile. The patient turns to the right in walking. On the left there is a definite adduction of the arm in the extension of the arm movements. The left knee and ankle jerk are more spastic than the right, with definite opposition and

flexion on the left. A slight erythema is present.

LABORATORY: I.P. 180; dynamics normal; 18 cc. removed; E.P. 180; 2 RBC;

protein 52 mg/100 cc.; cells and 0001000000; Wasserman negative.

URINE: Straw; acid; sp. gr. 1.025; no sugar nor albumen.

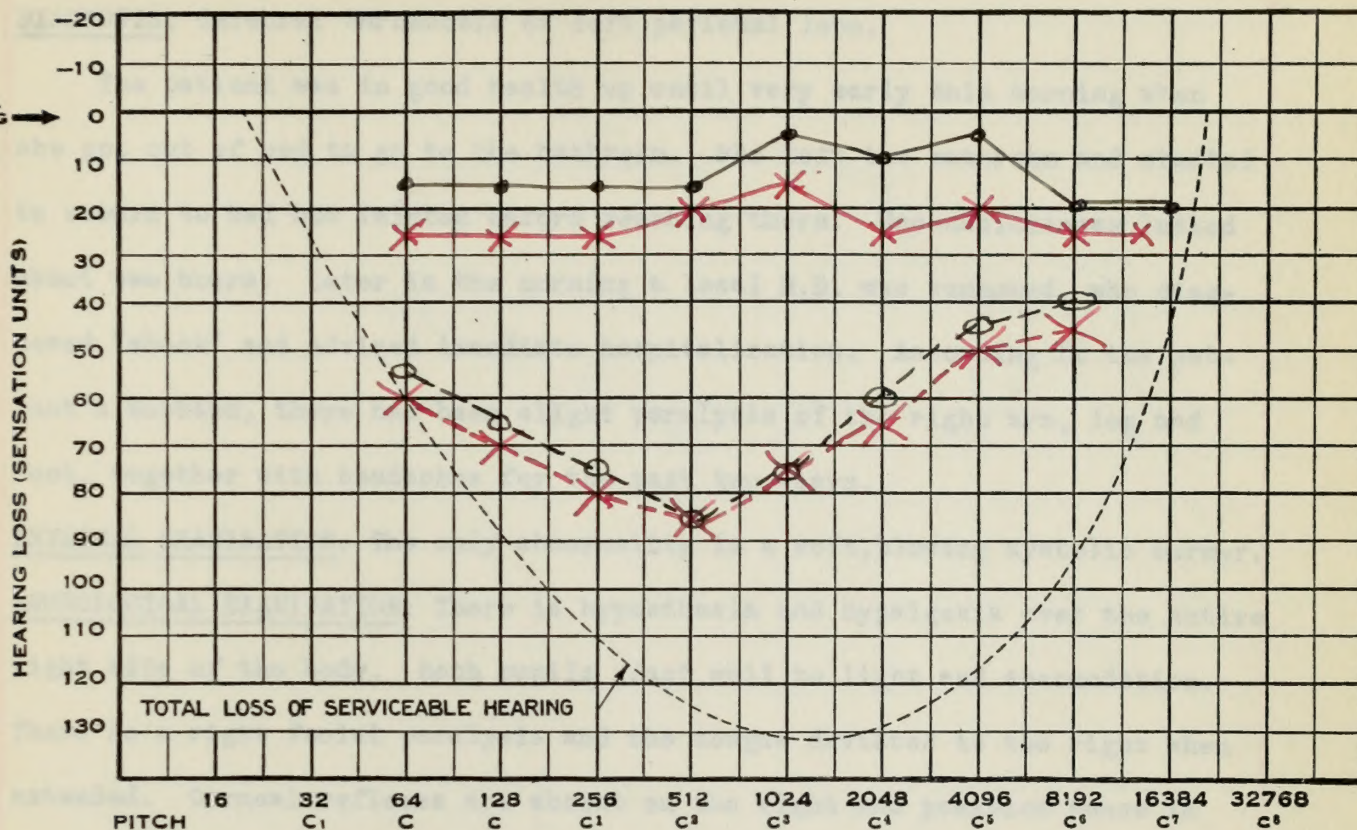
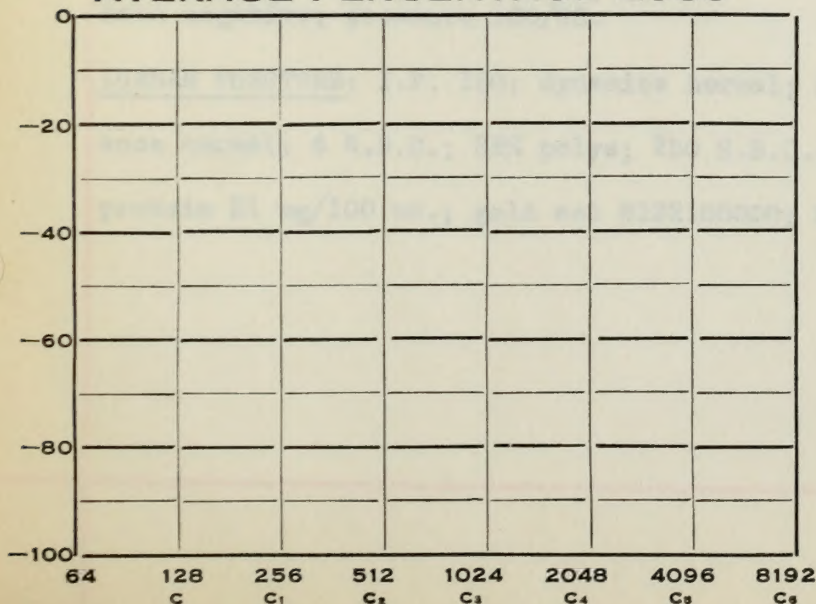
BLOOD: 80% Hgb.; 4,250,000 R.B.C.; 8,400 W.B.C.; W.P.N. 18; S.E. 32;

pressure 85/55.

At operation a mass resembling tumor tissue was encountered beneath the

surface of the left cerebellar lobe.

The audiotape was not rechecked following operation as patient was unable to cooperate sufficiently up to the time of discharge.

EVANS MEMORIAL**AUDIOGRAM**NAME M.C. 735843
DATE..... 19.....*Weber Left at 4 Points***AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne $\frac{AC}{BC}$

Weber

Upper Limit

Lower Limit

Whisper

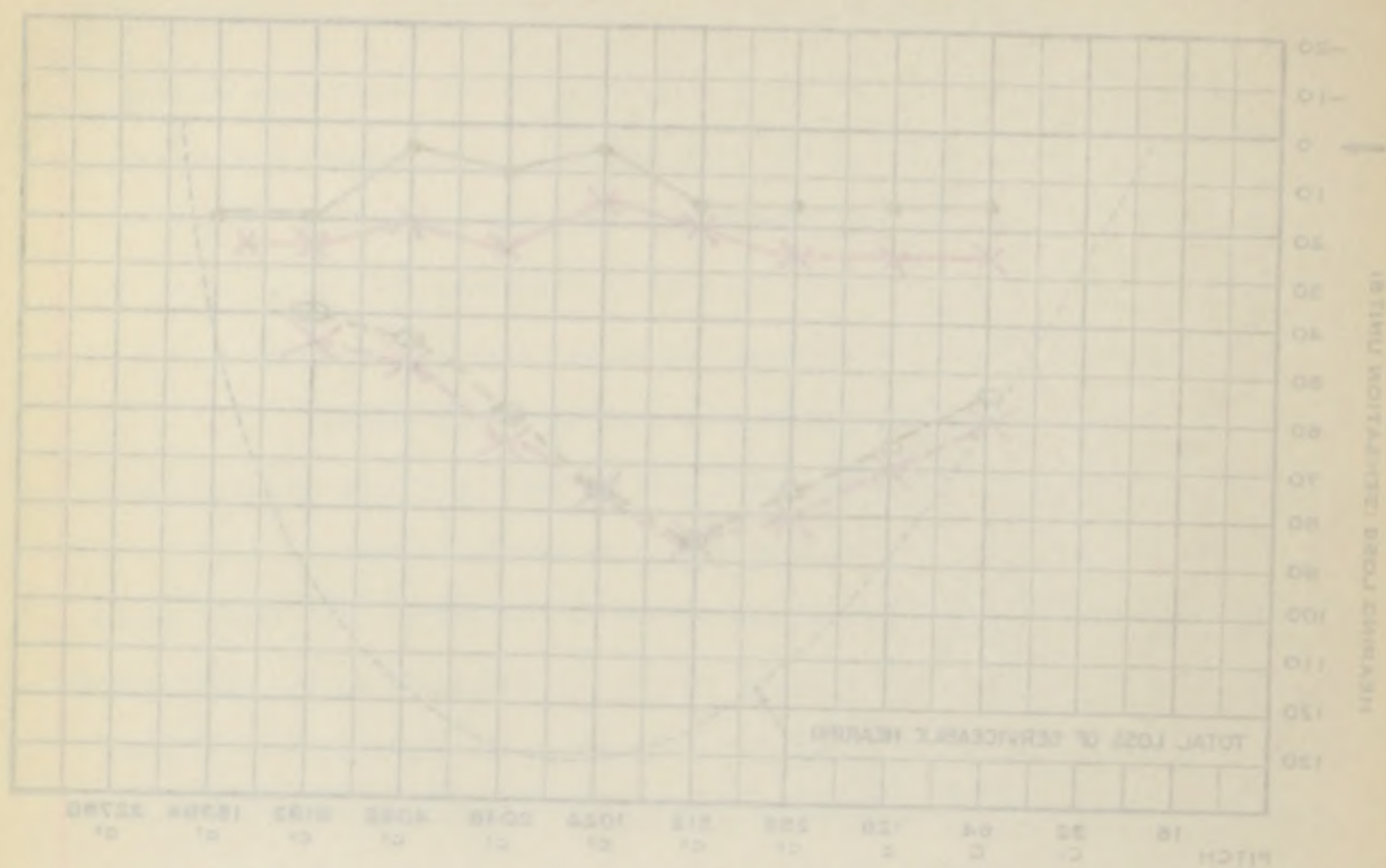
Voice

EVANS MEMORIAL

AUDIOGRAM

NAME M.C.
DATE 19

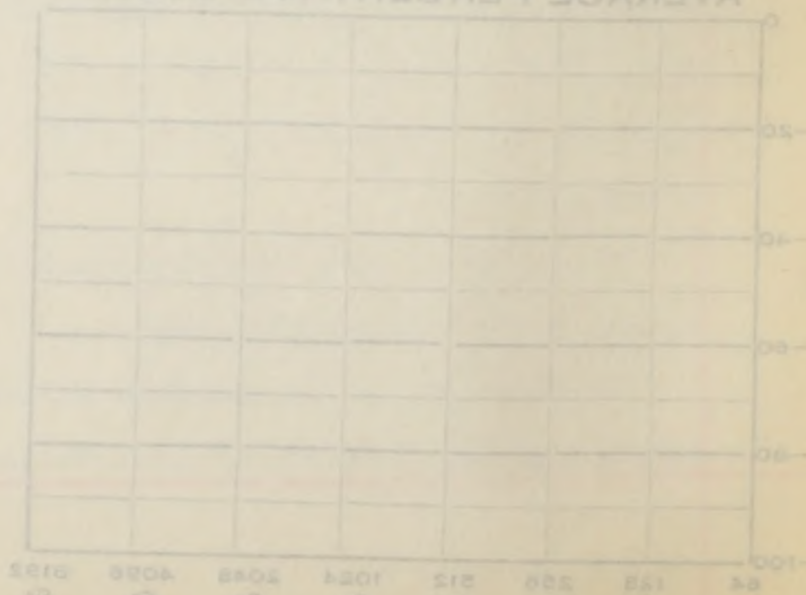
732843



Intensity Hearing Loss
Right Ear
Left Ear

Weber Left at 4 Points

AVERAGE PERCENTAGE LOSS



- 1. Balance
 - 2. Pain
 - 3. Fatigue
 - 4. Tinnitus
 - 5. Headache
 - 6. Dizziness
- Right Left
- AC BC
- Wedge
- Insert Limit
- Insert Limit
- Whisper
- Voices

M...C...; #735,843; Female; Age 32; White; Married.

DIAGNOSIS: Cerebral thrombosis of left parietal lobe.

The patient was in good health up until very early this morning when she got out of bed to go to the bathroom. She left the bathroom and started to return to bed but fainted before reaching there. Unconsciousness lasted about two hours. Later in the morning a local M.D. was summoned, who diagnosed "shock" and advised immediate hospitalization. According to the patient's husband, there has been slight paralysis of the right arm, leg and foot, together with headaches for the past two years.

PHYSICAL EXAMINATION: The only abnormality is a soft, blowing systolic murmur.

NEUROLOGICAL EXAMINATION: There is hypesthesia and hypalgesia over the entire right side of the body. Both pupils react well to light and accommodation. There is a right facial paralysis and the tongue deviates to the right when extended. Corneal reflexes are absent on the right and position sense is lost in the right arm, with asteriognosis of the right hand. There is a generalized right sided hyperreflexia.

URINE: Amber; acid; sp. gr. 1040; no sugar nor albumen; sediment shows pus, red blood and epithelial cells.

BLOOD: 85% Hgb.(T); 5,100,000 R.B.C.; 14,000 W.B.C.; N.P.N. 28; B.S. 80; Kahn negative; pressure 130/85.

LUMBAR PUNCTURE: I.P. 150; dynamics normal; 20 cc. removed; F.P. 100; appearance normal; 4 W.B.C.; 25% polys; 250 R.B.C.; No Ross-Jones nor Pandy; protein 21 mg/100 cc.; gold sol 0122100000; Wasserman negative.

M...C...; 4738,843; Female; Age 32; White; Married.

DIAGNOSIS: Cerebral thrombosis of left parietal lobe.

The patient was in good health up until very early this morning when she got out of bed to go to the bathroom. She left the bathroom and started to return to bed but fainted before reaching there. Unconsciousness lasted about two hours. Later in the morning a local M.D. was summoned, who diagnosed "shock" and advised immediate hospitalization. According to the patient's husband, there has been slight paralysis of the right arm, leg and foot, together with headaches for the past two years.

PHYSICAL EXAMINATION: The only abnormality is a soft, blowing systolic murmur.

NEUROLOGICAL EXAMINATION: There is hyposthesia and hyperaesthesia over the entire

right side of the body. Both pupils react well to light and accommodation.

There is a right facial paralysis and the tongue deviates to the right when

extended. Corneal reflexes are absent on the right and position sense is

lost in the right arm, with astereognosis of the right hand. There is a

Generalized right sided hyperreflexia.

URINE: Amber; acid; sp. gr. 1040; no sugar nor albumen; sediment shows pus,

red blood and epithelial cells.

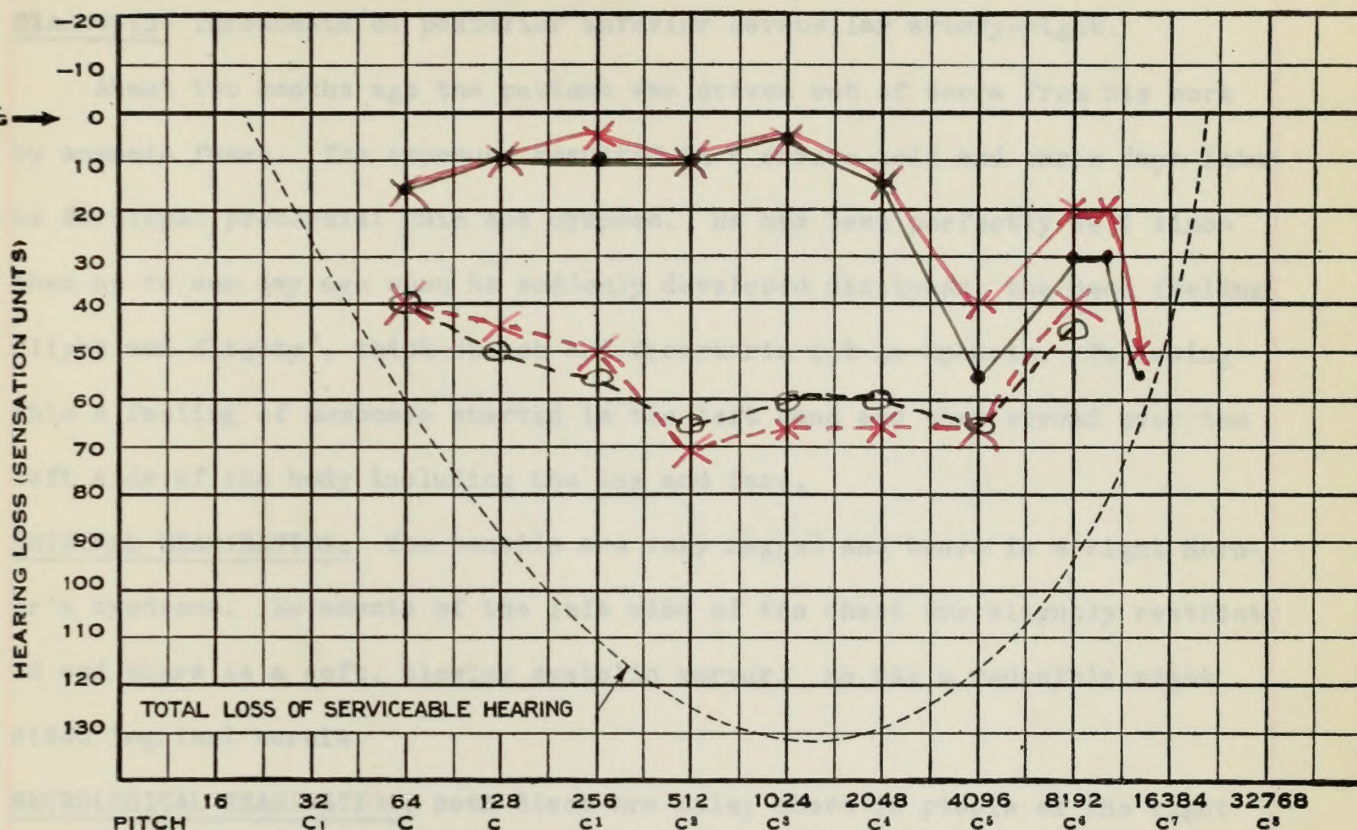
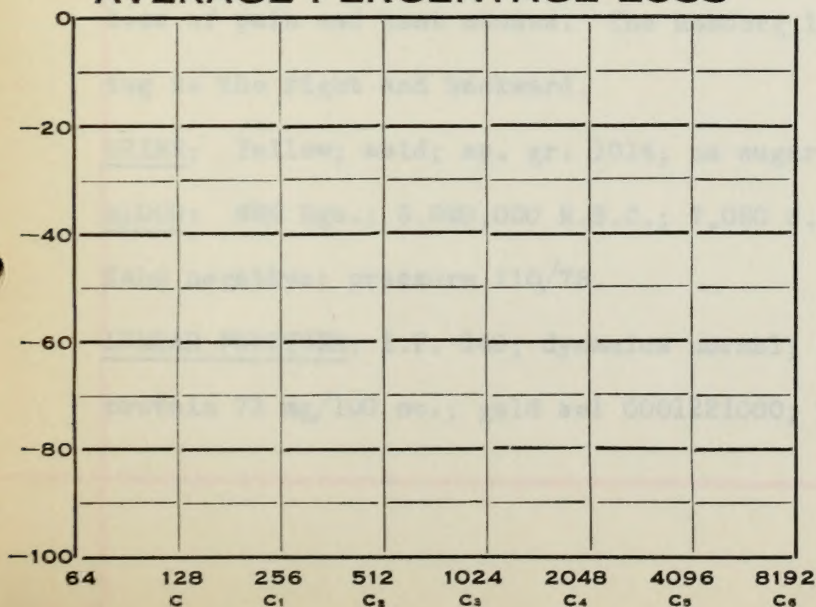
BLOOD: Hgb. (T); 5,100,000 R.B.C.; 14,000 W.B.C.; 8,900 N. 28; 8.3. 60;

Kahn negative; pressure 130/85.

URINARY FUNCTION: I.P. 180; dynamics normal; 20 cc. removed; P.F. 100; appar-

ance normal; 4 W.B.C.; 280 R.B.C.; No Ross-Jones nor Penhag;

protein 21 mg/100 cc.; fold and 0.123100000; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**NAME B.D. 729182
DATE _____ 19__**AVERAGE PERCENTAGE LOSS***Weber = at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right Left

Rinne AC

BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

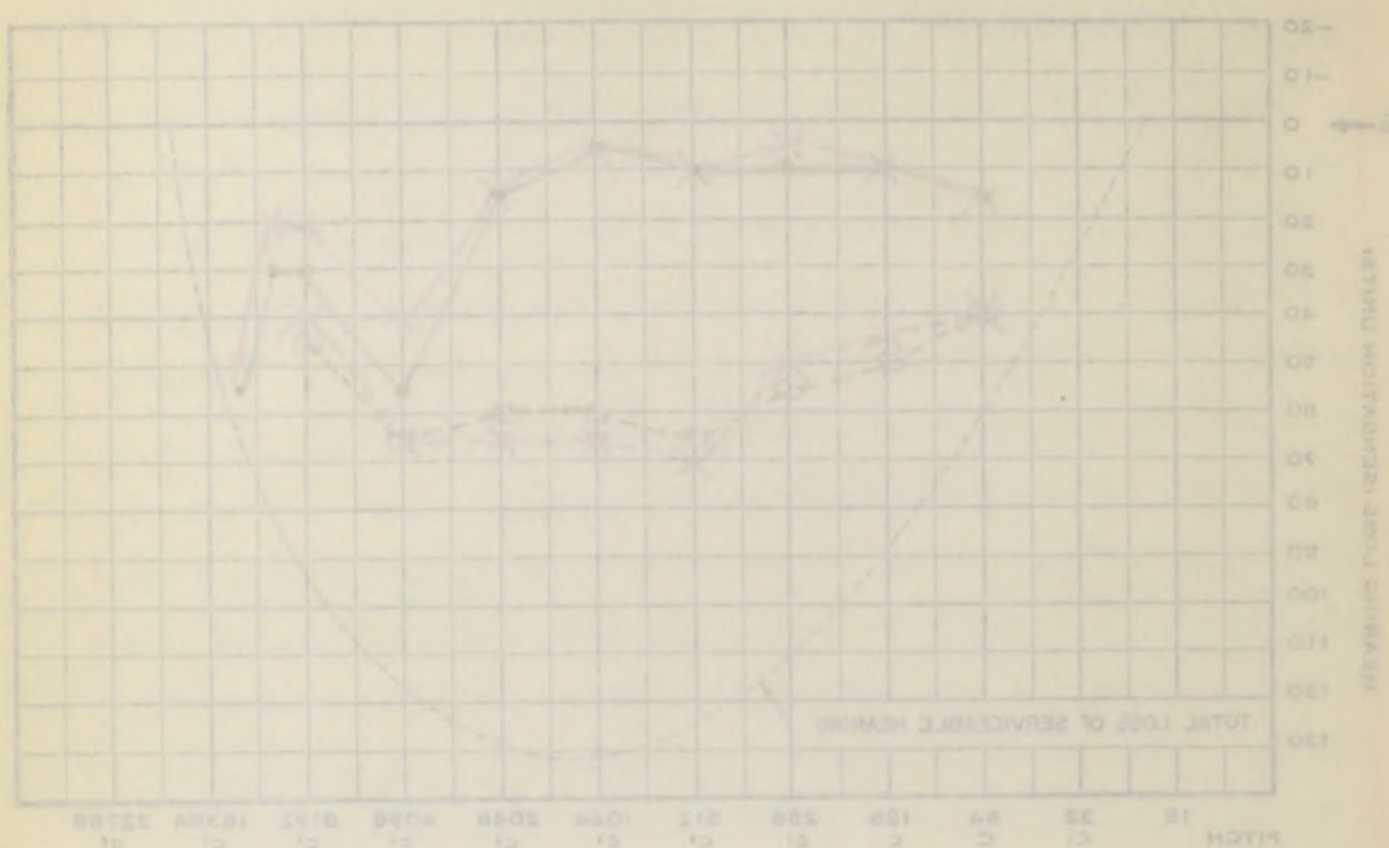
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

R.D. 729182

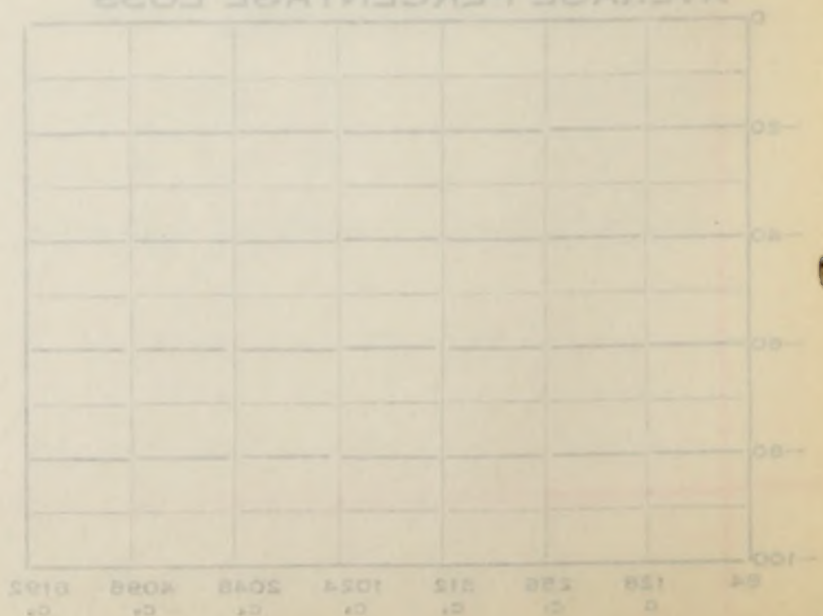
19



Frequency Hearing Loss
Right Ear
Left Ear

Weber at 4 points

AVERAGE PERCENTAGE LOSS



Diagnosis
Chief Complaint
1. Distress
2. Pain
3. Headache
4. Tinnitus
5. Vertigo
6. Deafness

Left
Right

Room 20
Weber
Upper Limit
Lower Limit
Whisper
Voice

B... D...; #729,182; Male; Age 45; White; Married.

DIAGNOSIS: Thrombosis of posterior inferior cerebellar artery-right.

About two months ago the patient was driven out of doors from his work by ammonia fumes. The exposure resulted in a severe cold and three days later he developed precordial pain and dyspnea. He has been perfectly well since then up to one day ago when he suddenly developed dizziness, the head feeling "light and flighty", thick speech and disarthria but no aphasia. Following this a feeling of numbness started in the left hand and then spread over the left side of the body including the leg and face.

PHYSICAL EXAMINATION: The tonsils are very ragged and there is a right Horner's syndrome. Movements of the left side of the chest are slightly restricted and there is a soft, blowing systolic murmur. He has a reducible right sided inguinal hernia.

NEUROLOGICAL EXAMINATION: Both discs are pale; there is ptosis of the right eyelid; pain and temperature sense is gone on the left side of the face; the jaw deviates to the right on opening; there is a left facial weakness on emotional smile; the palpebral fissure is narrower on the right; the tongue deviates to the right on extension and there is difficulty in swallowing, with a thickened speech. The entire left side of the body is numb with a loss of pain and heat senses. The Romberg is positive with the patient falling to the right and backward.

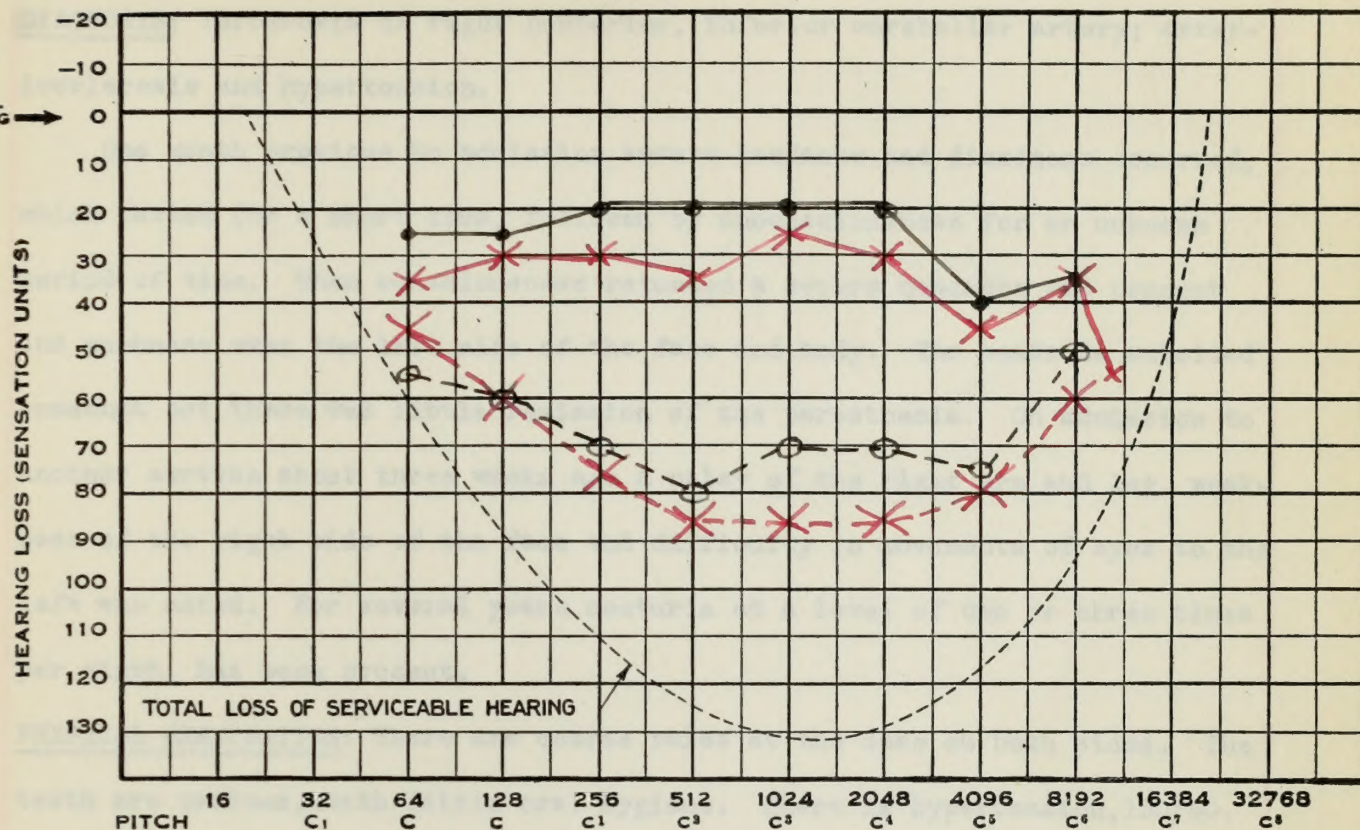
URINE: Yellow; acid; sp. gr. 1014; no sugar nor albumen.

BLOOD: 88% Hgb.; 5,020,000 R.B.C.; 7,050 W.B.C.; N.P.N. 27; B.S. 70; Kahn negative; pressure 110/78.

LUMBAR PUNCTURE: I.P. 140; dynamics normal; F.P. 50; 2 W.B.C.; 45 R.B.C.; protein 73 mg/100 cc.; gold sol 0001221000; Wasserman negative.

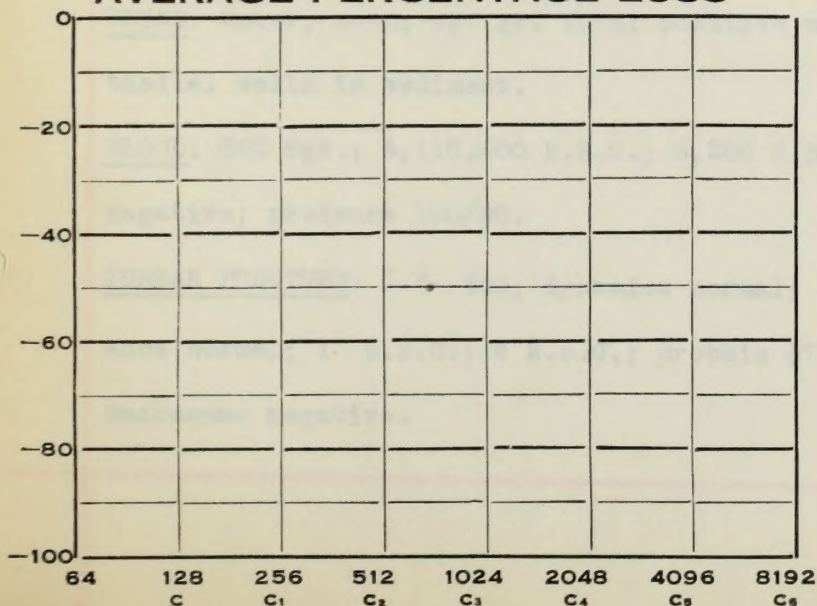
EVANS MEMORIAL

AUDIOGRAM

 NAME M.S. 726883
 DATE 19.....


Weber = at 4 Points

AVERAGE PERCENTAGE LOSS



Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right Left

..... Rinne AC BC

..... Weber

..... Upper Limit.....

..... Lower Limit.....

..... Whisper.....

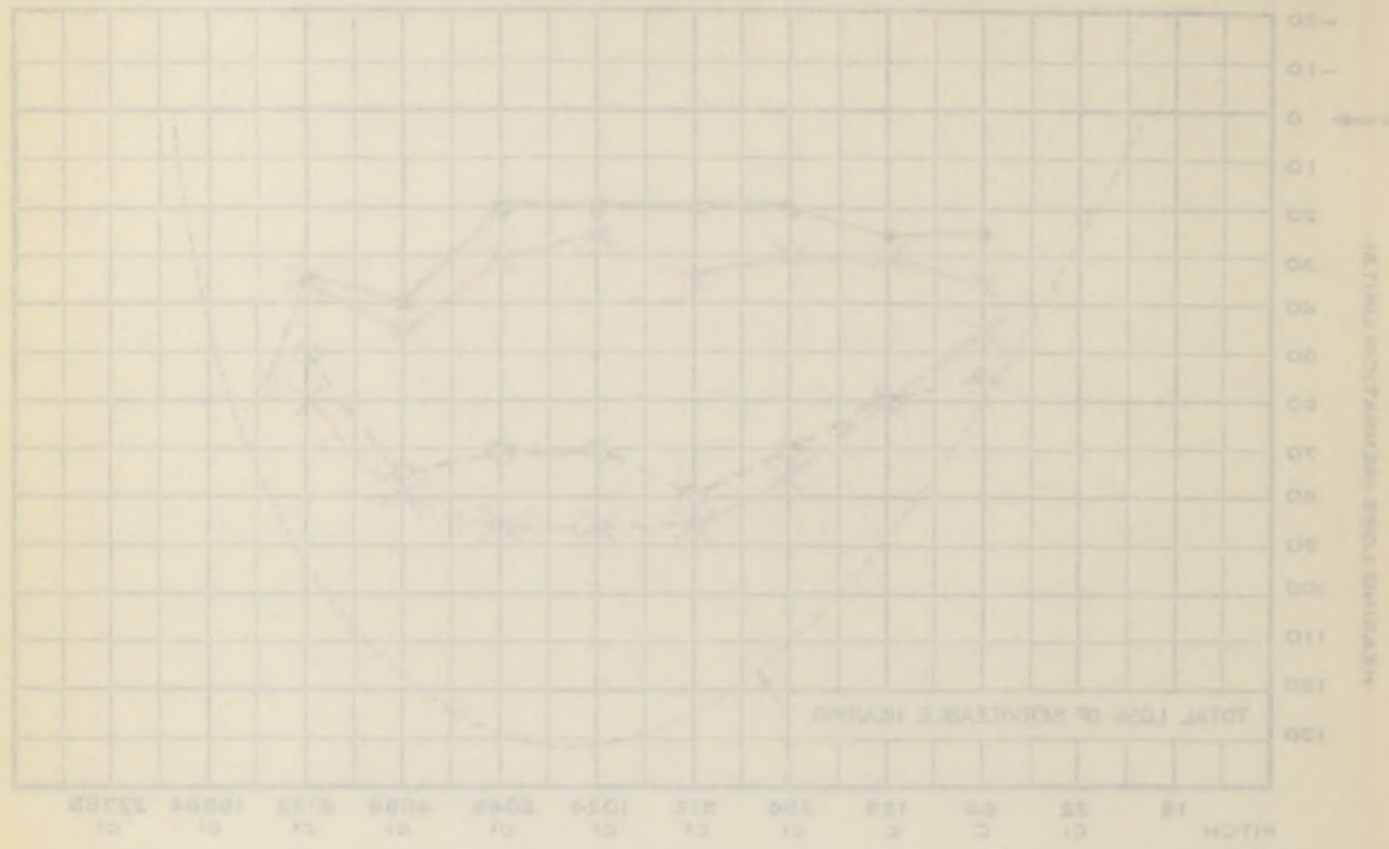
..... Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME W.S.
DATE

226883



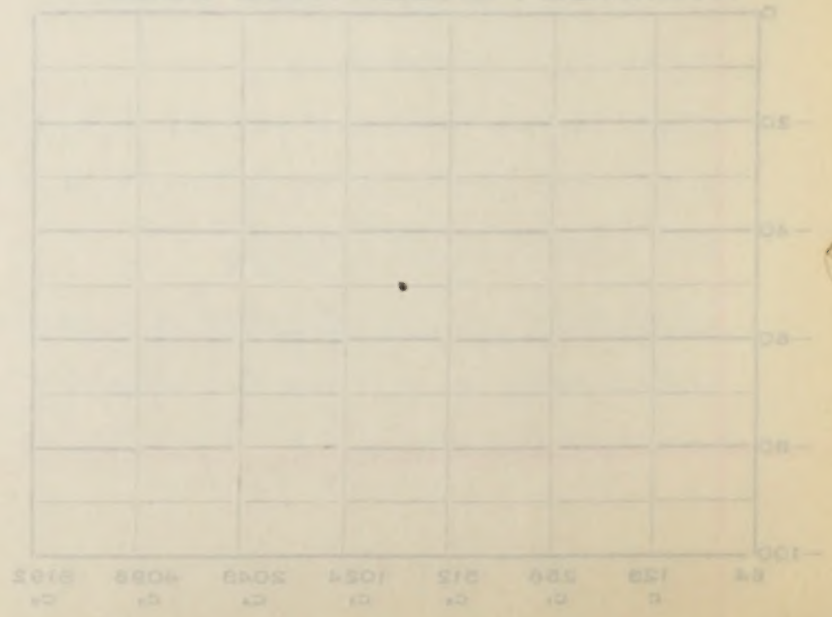
Forward Hearing Test

Right Ear

Left Ear

W.P.R. = at 4 Points

AVERAGE PERCENTAGE LOSS



Diagnosis _____
Diagnosis _____
Chief Complaint _____
1. Location _____
2. Type _____
3. History _____
4. Treatment _____
5. Remarks _____
6. Comments _____

Right _____
Left _____
Diagnosis _____
Diagnosis _____
Diagnosis _____
Diagnosis _____
Diagnosis _____
Diagnosis _____

M... S...; #726,883; Male; Age 59; White; Widower.

DIAGNOSIS: Thrombosis of right posterior, inferior cerebellar artery; arteriosclerosis and hypertension.

One month previous to admission severe headache and dizziness occurred, which lasted for a short time, followed by unconsciousness for an unknown period of time. When consciousness returned a severe headache was present and numbness over the left side of the face and body. The headache subsided somewhat but there was little remission of the paresthesia. On admission to another service about three weeks ago a palsy of the right arm and leg, weakness of the right side of the face and difficulty in movements of eyes to the left was noted. For several years nocturia at a level of two or three times per night, has been present.

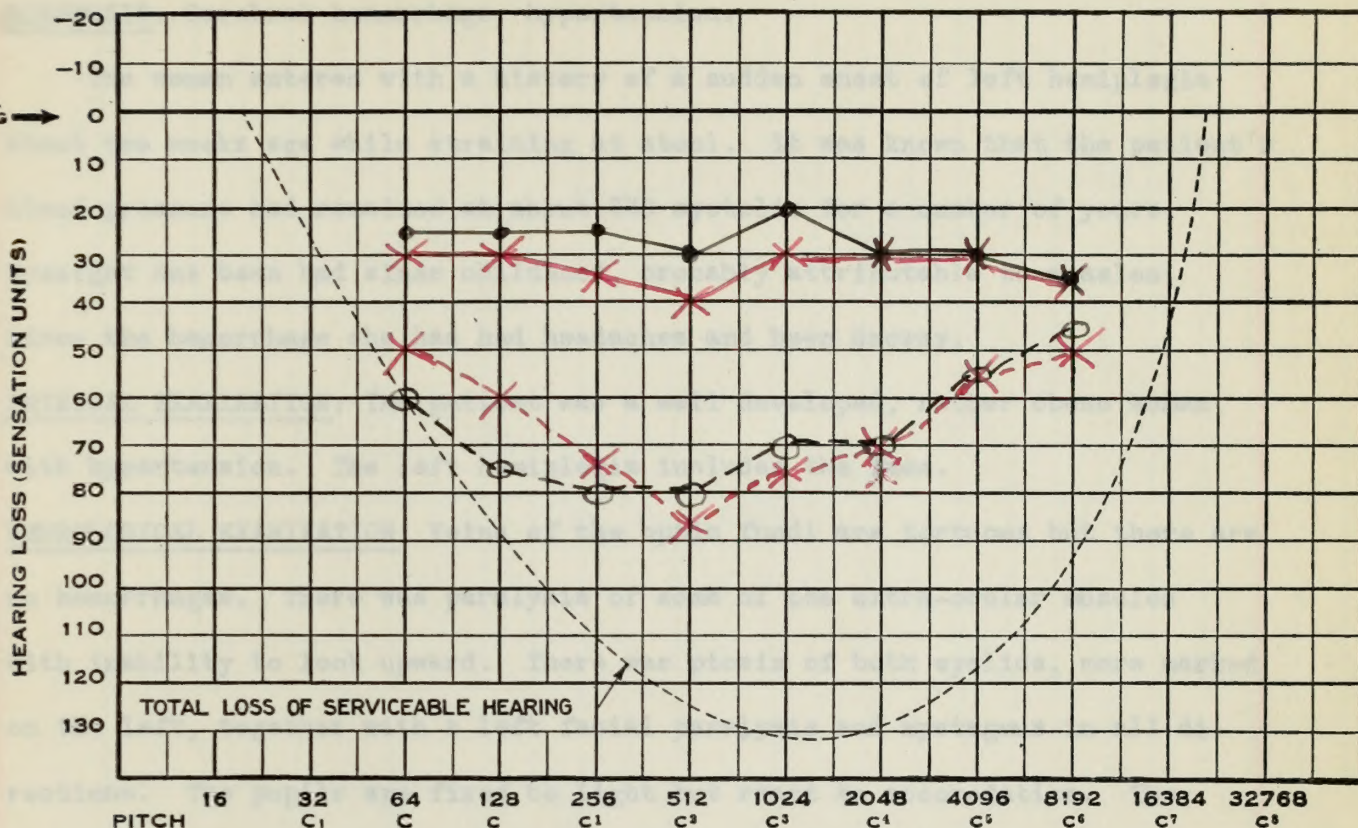
PHYSICAL EXAMINATION: There are coarse rales at the base on both sides. The teeth are carious, with little oral hygiene. There is hypertension, 150/90.

NEUROLOGICAL EXAMINATION: Both eyes are extremely myopic and diplopia is present on looking to the left, with the right corneal reflex absent. The palate is weak on the right and there is a right Horner's syndrome. There is sensory hypalgesia and hypothermesthesia, as well as a feeling of numbness of the whole left side of the face and body. Touch is preserved throughout.

URINE: Amber; acid; sp. gr. 1014; positive albumen; no sugar; occasional epithelial cells in sediment.

BLOOD: 85% Hgb.; 4,110,000 R.B.C.; 6,200 W.B.C.; N.P.N. 29; B.S. 95; Kahn negative; pressure 150/90.

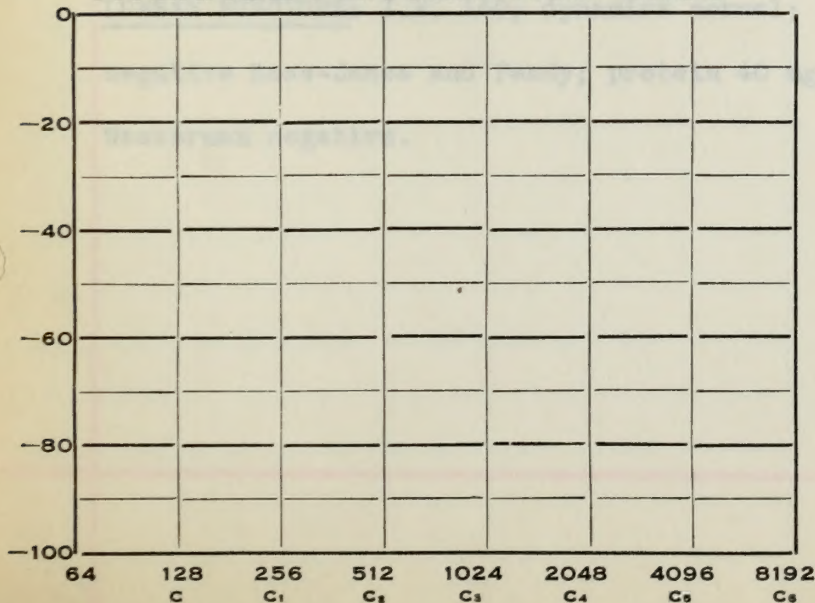
LUMBAR PUNCTURE: I.P. 140; dynamics normal; 15 cc. removed; F.P. 45; appearance normal; 1 W.B.C.; 4 R.B.C.; protein 37 mg/100 cc.; gold sol 0001110000; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**NAME D.B. 705961DATE 19

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber = at 3 Points
Right at Chin

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right Left

Rinne AC BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

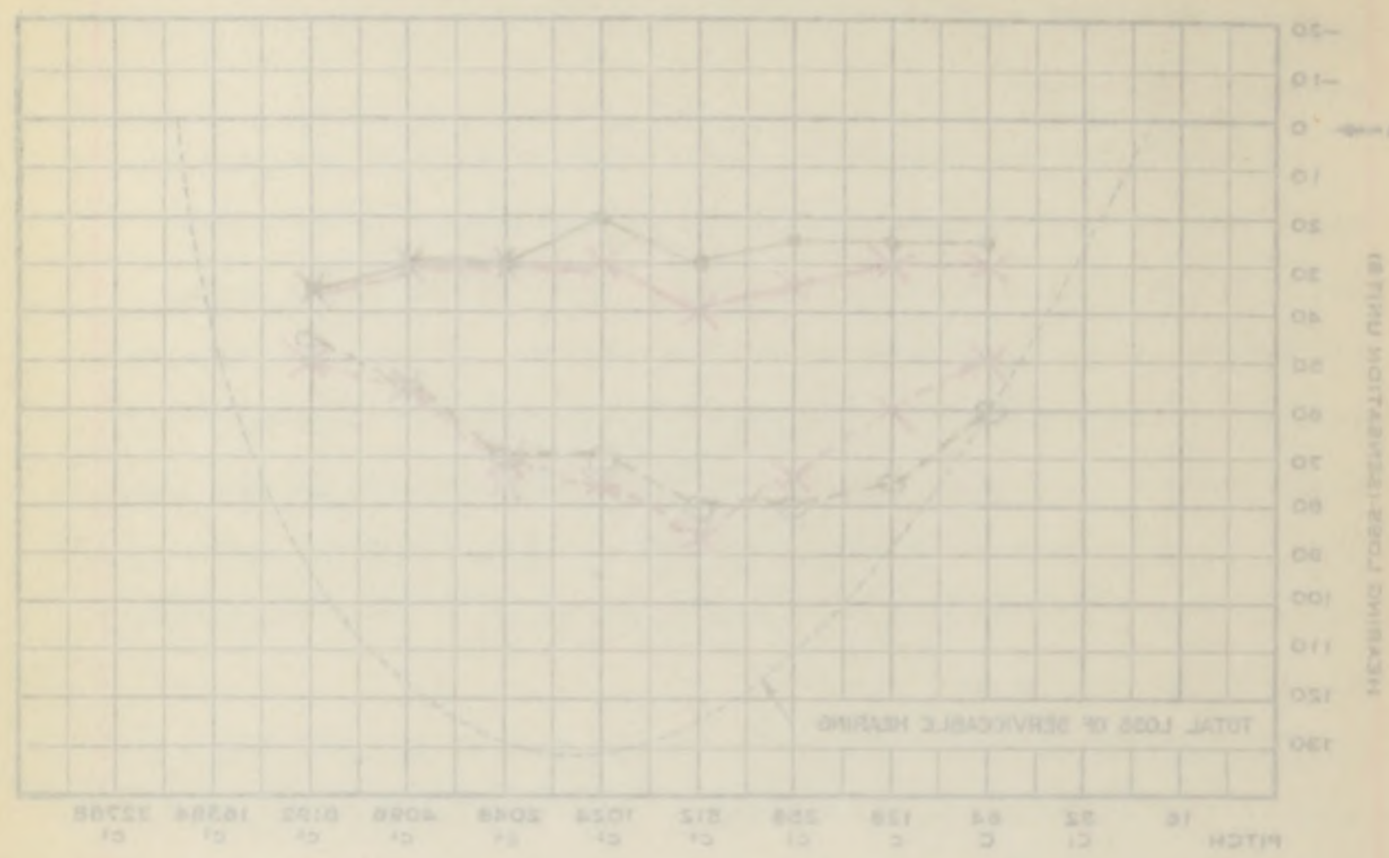
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

P.D. 702961

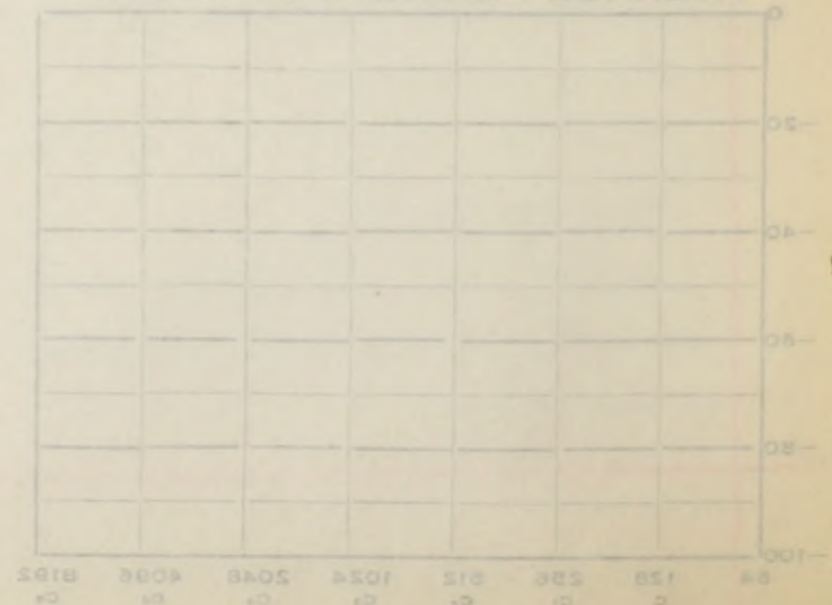
13



Through Hearing Loss
Right Ear
Left Ear

Right of Chin
Weber - at 8 points

AVERAGE PERCENTAGE LOSS



- Diagnosis
- Duration
- Chief Complaint
- 1. Deafness
- 2. Pain
- 3. Discharge
- 4. Tinnitus
- 5. Headache
- 6. Dizziness

Right
Left
Rinne
Weber
Upper Limit
Lower Limit
Whisper
Voice

D...B...; #705,961; Female; Age 43; White; Married.

DIAGNOSIS: Cerebral hemorrhage; hypertension.

The woman entered with a history of a sudden onset of left hemiplegia about two weeks ago while straining at stool. It was known that the patient's blood pressure had remained at about 220 systolic for a number of years. Eyesight has been bad since childhood, probably attributable to measles. Since the hemorrhage she has had headaches and been drowsy.

PHYSICAL EXAMINATION: The patient was a well developed, rather obese woman with hypertension. The left hemiplegia includes the face.

NEUROLOGICAL EXAMINATION: Veins of the optic fundi are tortuous but there are no hemorrhages. There was paralysis of some of the extra-ocular muscles with inability to look upward. There was ptosis of both eyelids, more marked on the left, together with a left facial paralysis and nystagmus in all directions. The pupils are fixed to light but react to accommodation. The tongue deviates to the left on extension. The left arm and leg are spastic with a Babinski on that side.

URINE: Amber; acid; sp. gr. 1020; no sugar nor albumen.

BLOOD: 95% Hgb.; 5,000,000 R.B.C.; 11,000 W.B.C.; Kahn negative; N.P.N. 43, later 22.

LUMBAR PUNCTURE: I.P. 140; dynamics normal; 10 cc. removed; F.P. 50; 4 W.B.C.; negative Ross-Jones and Pandy; protein 40 mg/100 cc.; gold sol 0001100000; Wasserman negative.

D...B...; 4700, 501; Female; Age 42; White; Married.

DIAGNOSIS: Cerebral hemorrhage; hypertension.

The woman entered with a history of a sudden onset of left hemiplegia about two weeks ago while standing at school. It was known that the patient's blood pressure had remained at about 220 systolic for a number of years. Weight has been bad since childhood, probably attributable to anemia, since the hemorrhage she has had headaches and been dizzy.

PHYSICAL EXAMINATION: The patient was a well developed, rather obese woman with hypertension. The left hemiplegia involved the face.

NEUROLOGICAL EXAMINATION: Vain of the optic fundi are tortuous but there are no hemorrhages. There was paralysis of some of the extra-ocular muscles

with inability to look upward. There was ptosis of both eyelids, more marked on the left, together with a left facial paralysis and paralysis in all directions. The pupils are fixed to light but react to accommodation. The tongue deviated to the left on extension. The left arm and leg are spastic with a Babinski on that side.

URINE: Amber; acid; sp. gr. 1.020; no sugar nor albumen.

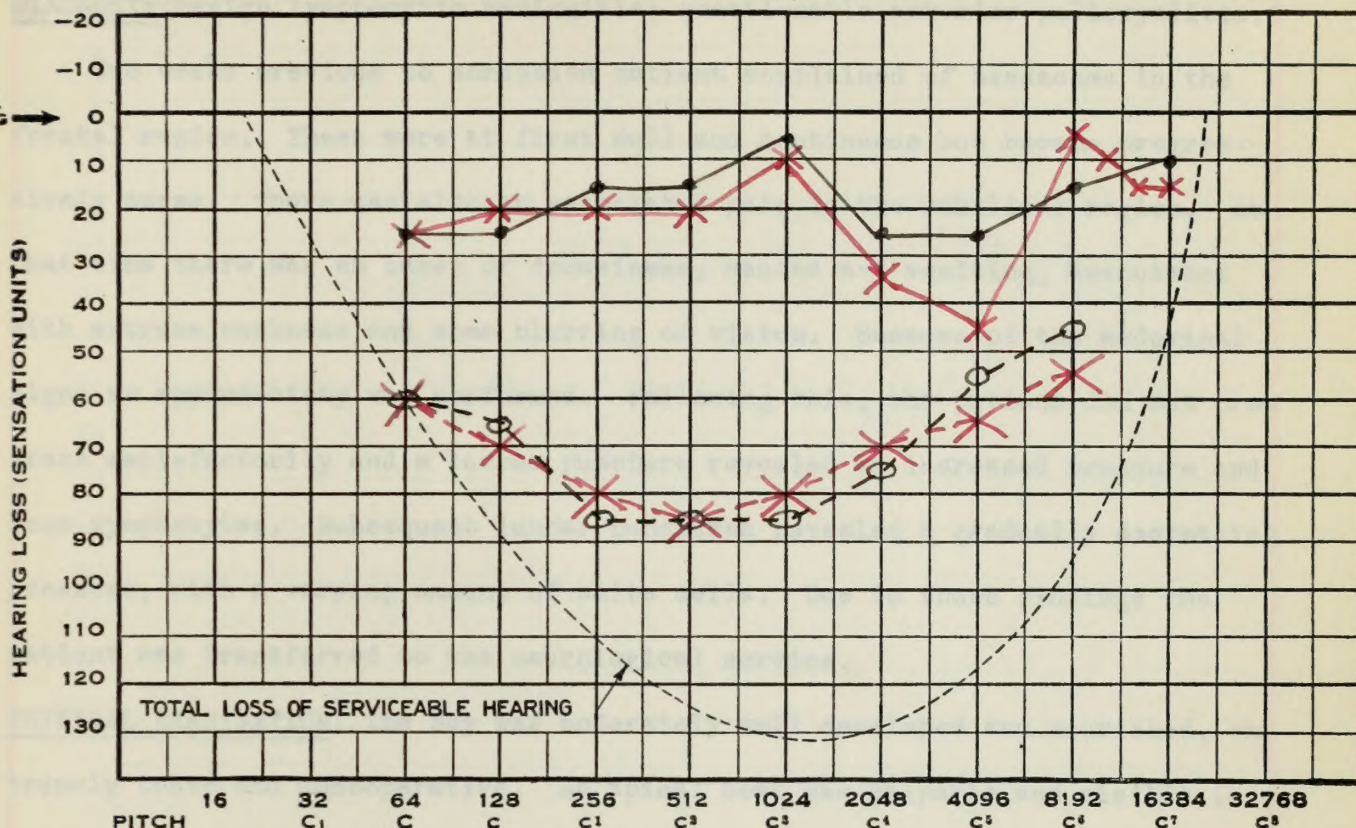
BLOOD: 85% Hgb.; 5,000,000 R.B.C.; 11,000 W.B.C.; Kahn negative; S.P.H. 43.

later 32.

LUMBAR PUNCTURE: 1.5. 140; dynamics normal; 10 cc. removed; S.P. 50; W.B.C. negative Rosen-Jones and Pandey; protein 40 mg/100 cc.; cells not countable; Gram stain negative.

EVANS MEMORIAL**AUDIOGRAM**NAME L. J. 741958

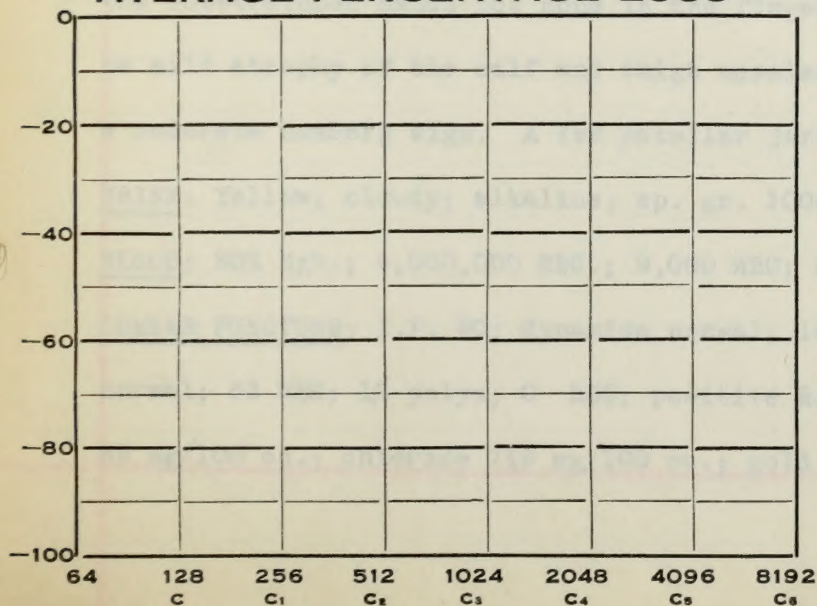
DATE..... 19.....



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber = at 3 Points
Left at Vertex

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right

Left

Rinne AC
BC

Weber

Upper Limit

Lower Limit

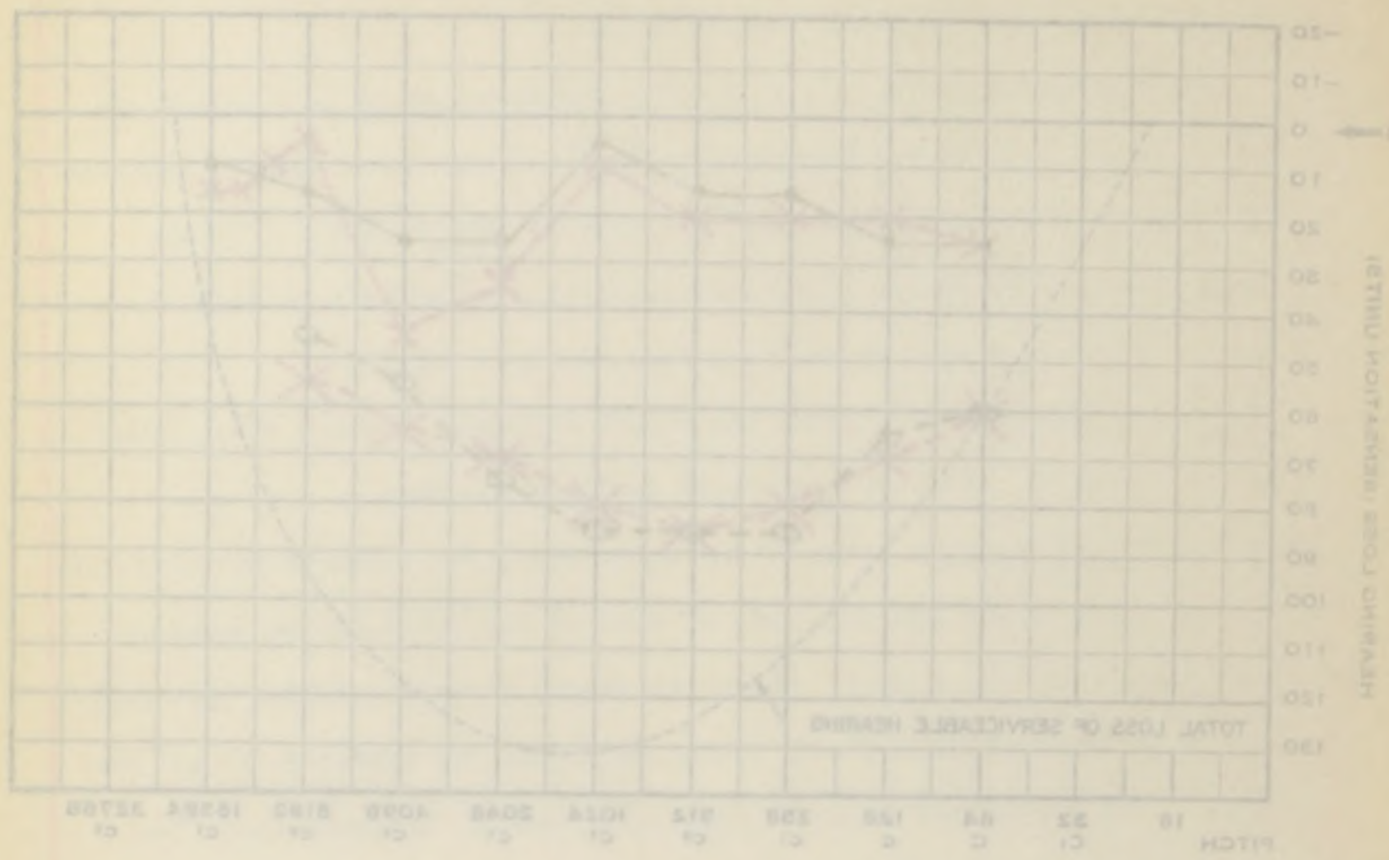
Whisper

Voice

EVANS MEMORIAL

AUDIOGRAM

NAME A. G. 74198
 DATE 19



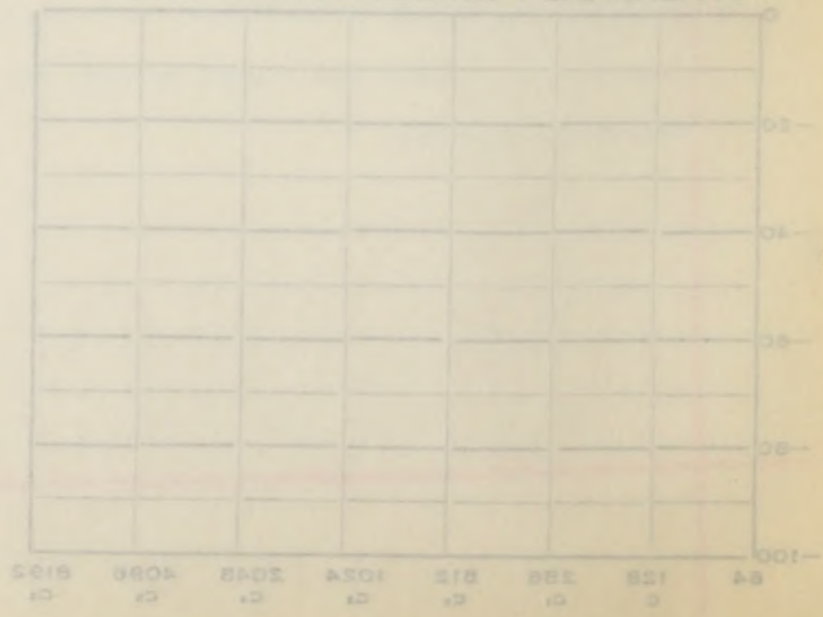
Frequency Hearing Loss

Right Ear

Left Ear

Webster - at 3 Points
 Left at Vertex

AVERAGE PERCENTAGE LOSS



Diagnosis _____
 Duration _____
 Chief Complaint _____
 1. Test _____
 2. Test _____
 3. Test _____
 4. Test _____
 5. Test _____
 6. Test _____
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 98. Test _____
 99. Test _____
 100. Test _____

L... J...; #741,958; Male; Age 15; Colored; Single.

DIAGNOSIS: Benign lymphocytic meningitis; questionable anterior poliomyelitis.

Two weeks previous to admission patient complained of headaches in the frontal region. These were at first dull and continuous but became progressively worse. There was also an associated pain in the umbilical region. At that time there was an onset of drowsiness, nausea and vomiting, associated with extreme weakness and some blurring of vision. Because of the abdominal signs an appendectomy was performed. Following this, the patient did not progress satisfactorily and a lumbar puncture revealed an increased pressure and some polymorphocytes. Subsequent lumbar punctures revealed a gradually decreasing pressure, with a varying amount of white cells. Due to these findings the patient was transferred to the neurological service.

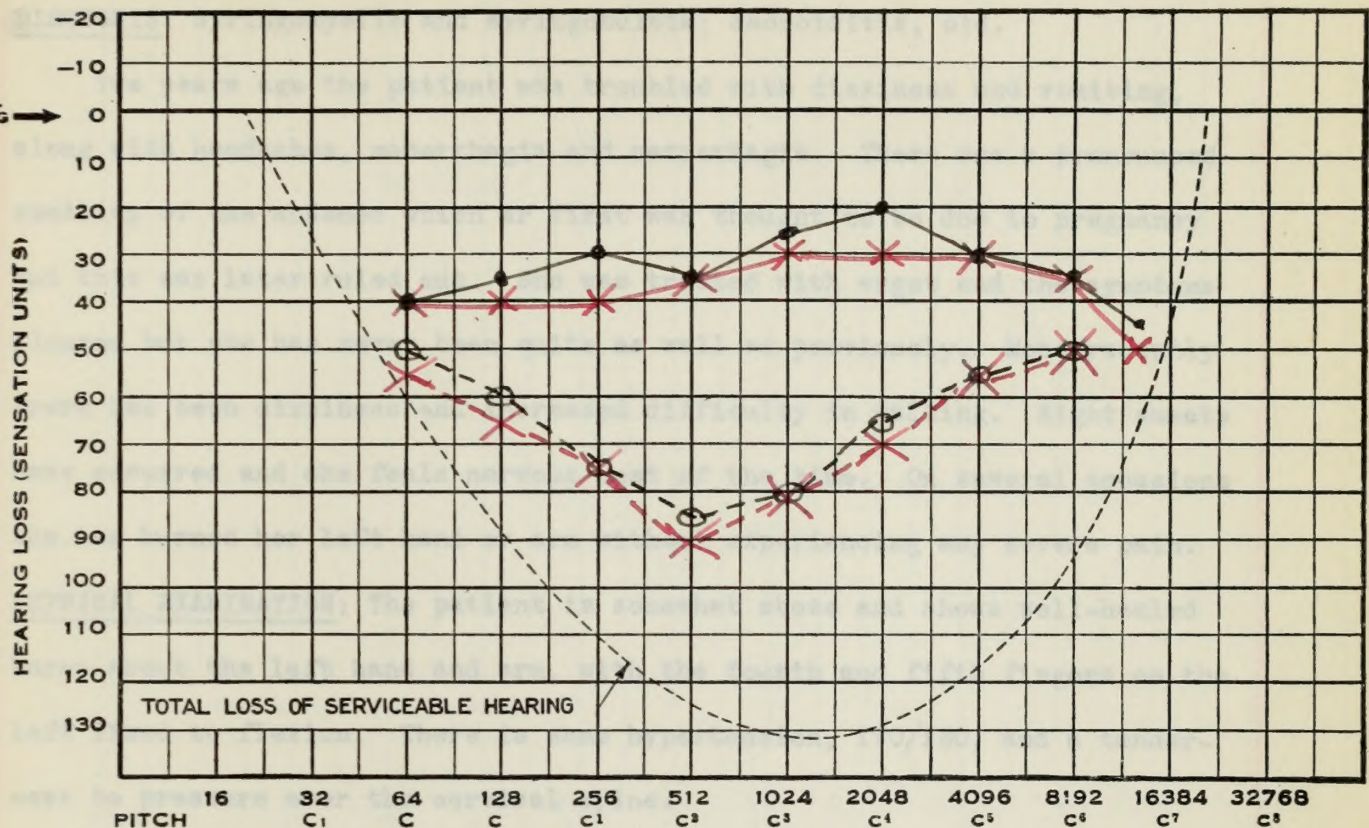
PHYSICAL EXAMINATION: The boy was moderately well developed and nourished, extremely tense and uncooperative. An apical beat was palpable and visible in the sixth intercostal space. There was an old scar on the right groin and some palpable inguinal lymph glands. The incisors were wide spaced and irregular.

NEUROLOGICAL EXAMINATION: The patient appeared well oriented and rational although somewhat apprehensive, with poor cooperation. The pupils were mydriatic but reacted well to light and accommodation. There was a coarse tremor of the outstretched hands but none in the finger to nose test. There appeared to be mild atrophy of the calf and thigh muscles, and generalized weakness, with a moderate Romberg sign. A few patellar jerks were present bilaterally.

URINE: Yellow; cloudy; alkaline; sp. gr. 1004; no sugar nor albumen.

BLOOD: 80% Hgb.; 4,000,000 RBC.; 9,000 WBC; Kahn negative; NPN 29; B.S. 83.

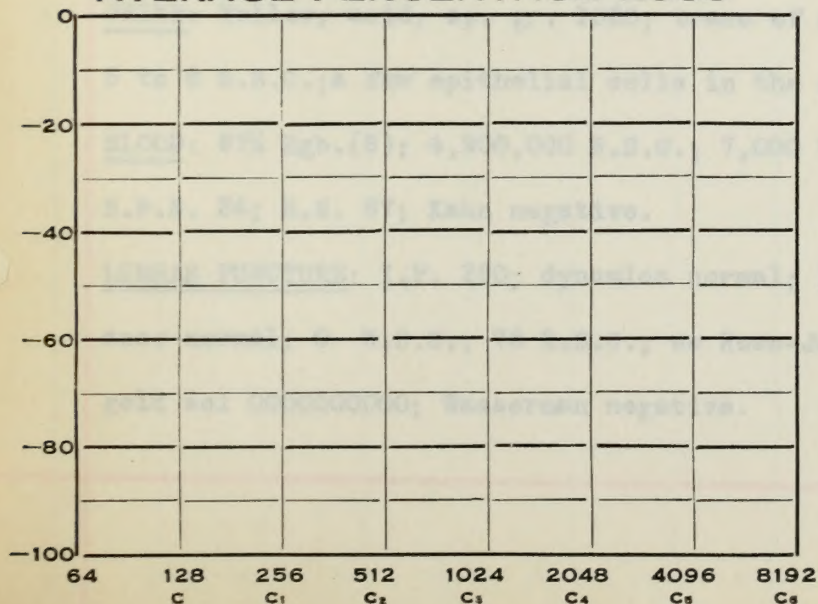
LUMBAR PUNCTURE: I.P. 90; dynamics normal; 15 cc. removed; F.P. 35; appearance normal; 63 WBC; 1% polys; 0 RBC; positive Ross-Jones and Pandy; protein 63 mg/100 cc.; chloride 719 mg/100 cc.; gold sol 0122110000; Wasserman neg.

EVANS MEMORIAL**AUDIOGRAM**NAME I.F. 734255
DATE.....19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber = at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

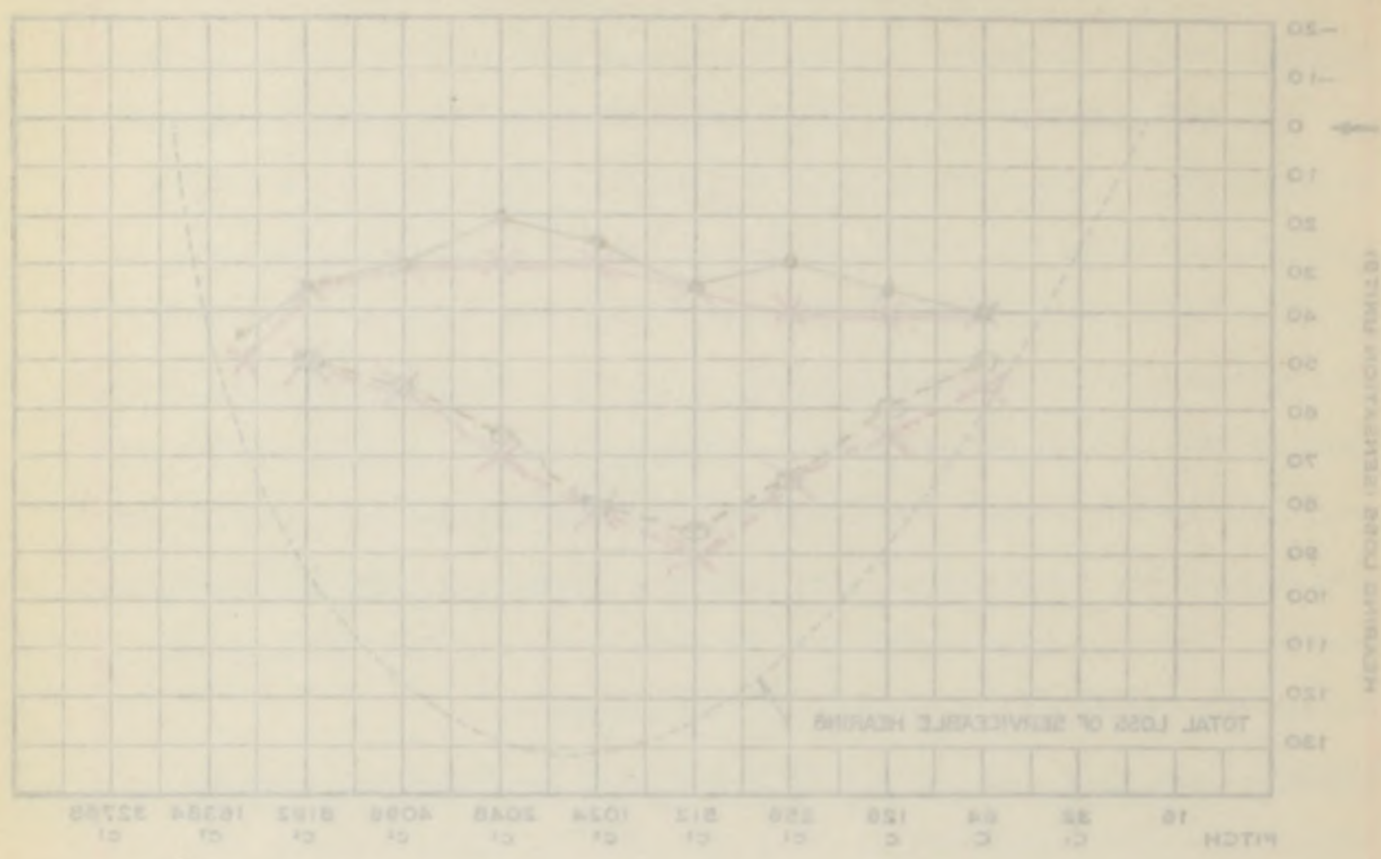
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

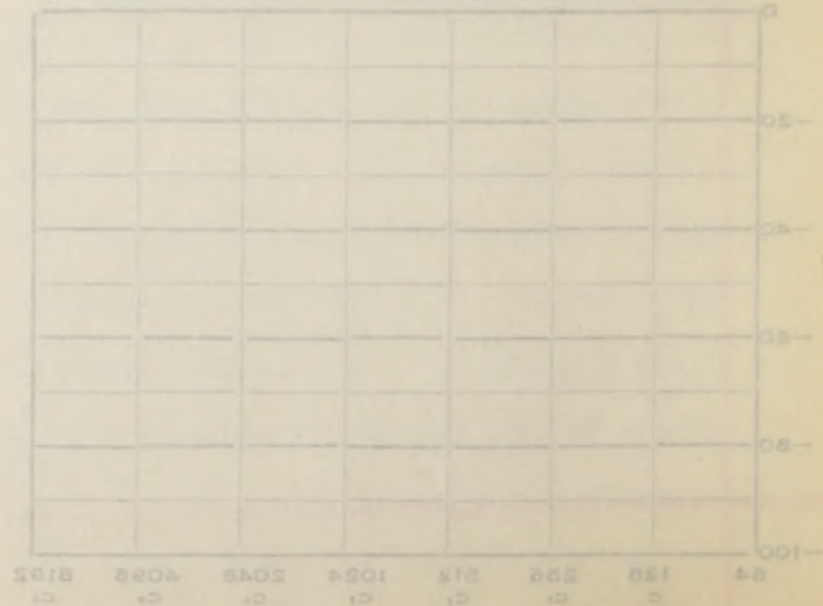
L.F.

934222



Receptive Hearing Test
Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Disease _____
 Duration _____
 Chief Complaint _____
 1. Deafness _____
 2. Tinnitus _____
 3. Vertigo _____
 4. Headache _____
 5. Dizziness _____
 6. Other _____
 Right _____
 Left _____
 Weber _____
 Rinne _____
 Upper Limit _____
 Lower Limit _____
 Whisper _____
 Voice _____

Webster = at 4 Points

EVANS MEMORIAL

I...E...F...; #734,255; Female; Age 35; White; Married.

DIAGNOSIS: Syringomyelia and syringobulbia; choroiditis, old.

Two years ago the patient was troubled with dizziness and vomiting, along with headaches, menorrhagia and metrorrhagia. There was a pronounced swelling of the abdomen which at first was thought to be due to pregnancy but this was later ruled out. She was treated with ergot and the symptoms cleared but she has never been quite as well as previously. More recently there has been dizziness and increased difficulty in walking. Night sweats have occurred and she feels nervous most of the time. On several occasions she has burned her left hand or arm without experiencing any severe pain.

PHYSICAL EXAMINATION: The patient is somewhat obese and shows well-healed burns about the left hand and arm, with the fourth and fifth fingers on the left fixed to flexion. There is some hypertension, 170/130, and a tenderness to pressure over the cervical spine.

NEUROLOGICAL EXAMINATION: Areas of pigmentation are found in the right disc. There is bilateral circular nystagmus and a slight left facial weakness. A dorsal scoliosis may be seen, the left arm is weak, a slight intention tremor and numbness of the left hand and arm, with diminished sense of pain and temperature. The patient reels to the left in walking.

URINE: Yellow; acid; sp. gr. 1020; trace of albumen; no sugar; 10 to 20 RBC.; 5 to 8 W.B.C.; a few epithelial cells in the sediment.

BLOOD: 67% Hgb.(S); 4,900,000 R.B.C.; 7,000 W.B.C.; slight achromia; N.P.N. 24; B.S. 67; Kahn negative.

LUMBAR PUNCTURE: I.P. 280; dynamics normal; 15 cc. removed; F.P. 170; appearance normal; 0 W.B.C.; 76 R.B.C.; no Ross-Jones nor Pandy; protein 22 mg/100cc. gold sol 0000000000; Wasserman negative.

I...E...Y...: 4734, 255; Female; Age 35; White; Married.

DIAGNOSIS: Syringomyelia and syringobulbia; choroiditis, etc.

Two years ago the patient was troubled with dizziness and vomiting, along with headache, menorrhagia and metrorrhagia. There was a pronounced swelling of the abdomen which at first was thought to be due to pregnancy but this was later ruled out. She was treated with ergot and the symptoms cleared but she has never been quite as well as previously. More recently there has been dizziness and increased difficulty in walking. Night sweats have occurred and the facial nervous root of the time. On several occasions she has burned her left hand or arm without experiencing any severe pain.

PHYSICAL EXAMINATION: The patient is somewhat obese and shows well-healed burns about the left hand and arm, with the fourth and fifth fingers on the left fixed to flexion. There is some hypertension, 170/130, and a tender-ness to pressure over the cervical spine.

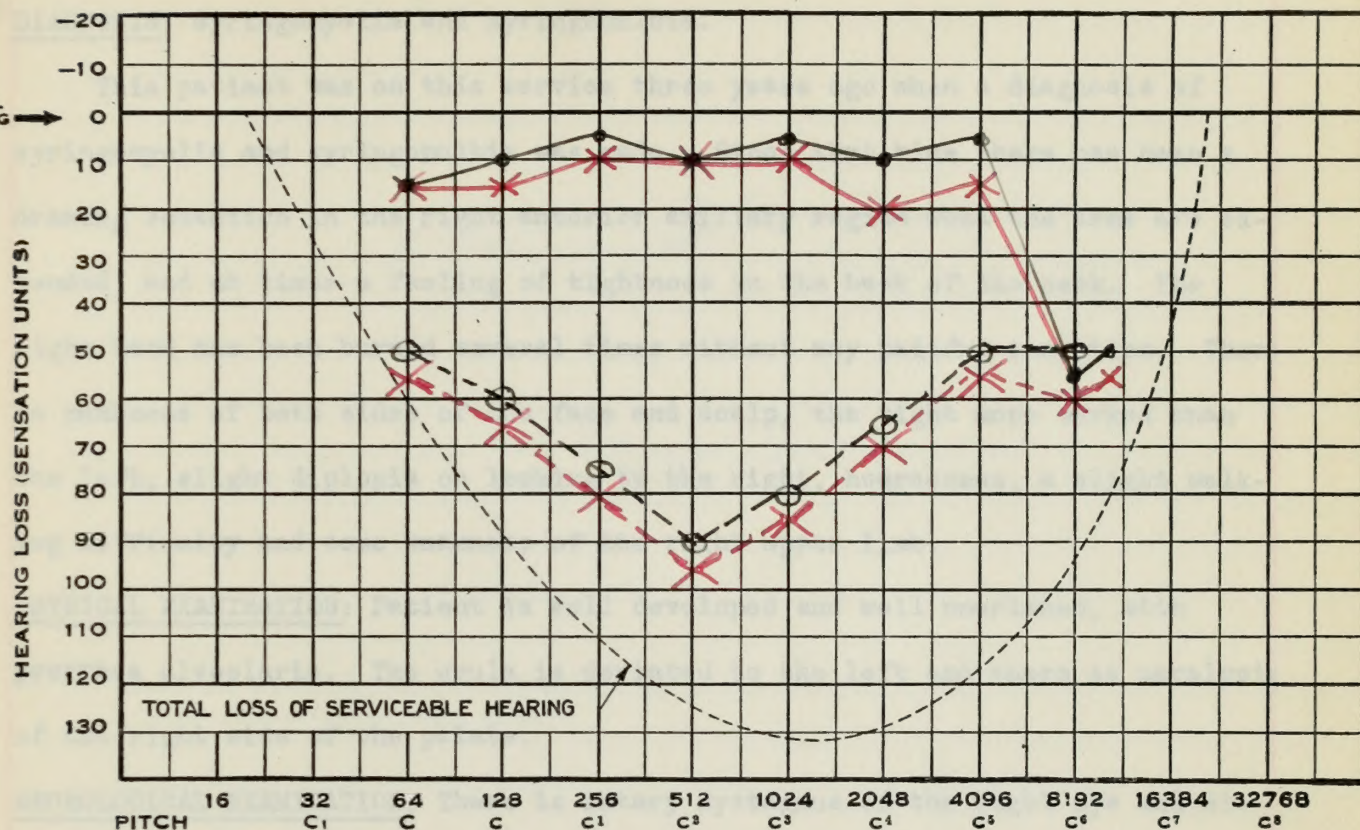
NEUROLOGICAL EXAMINATION: Areas of pinprick sensation are found in the right arm. There is bilateral optic atrophy, nystagmus and a slight left facial weakness. A dorsal scoliosis may be seen, the left arm is weak, a slight intention tremor and numbness of the left hand and arm, with diminished sense of pain and temperature. The patient feels to the left in walking.

URINE: Yellow; acid; sp. gr. 1.020; trace of albumen; no sugar; 10 to 20 HBC.

BLOOD: 87% Hgb. (2); 4,900,000 R.B.C.; 7,000 W.B.C.; slight leukocytosis.

S.P.W. 24; S.B. 37; Kahn negative.

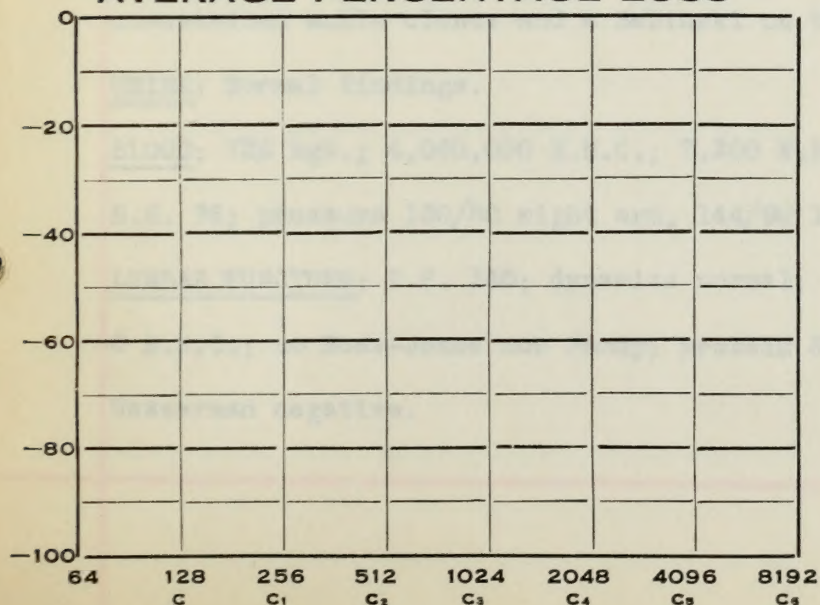
LABORATORY: I.P. 230; dynamics normal; 15 cc. removed; 7.7. 170; sugar-ness normal; 0 W.B.C.; 75 R.B.C.; no Ross-Jones nor Pandey; protein 22 mg/100 cc. Gold sol 000000000; Wassermann negative.

EVANS MEMORIAL**AUDIOGRAM**NAME P. P. 730 700
DATE.....19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber = at 4 Points

Disease

Duration

Chief Symptom.....

1. Deafness.....

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right

Left

AC
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

P... P...; #730,700; Male; Age 44; White; Single.

DIAGNOSIS: Syringomyelia and Syringobulbia.

This patient was on this service three years ago when a diagnosis of syringomyelia and syringobulbia was made. Since that time there has been a drawing sensation in the right anterior axillary region when the arms are extended, and at times a feeling of tightness in the back of the neck. The right hand has been burned several times without any painful sensation. There is numbness of both sides of the face and scalp, the right more marked than the left, slight diplopia on looking to the right, hoarseness, a slight walking difficulty and some weakness of the right upper limb.

PHYSICAL EXAMINATION: Patient is well developed and well nourished, with pyorrhea alveolaris. The uvula is deviated to the left and there is paralysis of the right side of the palate.

NEUROLOGICAL EXAMINATION: There is rotary nystagmus of the right eye and diplopia on looking to the right. The tongue deviates to the left and palate movements are to the left. There are cerebellar signs and hyperactive deep reflexes of both upper limbs. There is almost complete analgesia and hypothermesthesia over the right side of the face, left scalp and upper two divisions of the left fifth. Reflexes of the lower limbs are hyperactive with unsustained ankle clonus and a Babinski on the right.

URINE: Normal findings.

BLOOD: 72% hgb.; 4,060,000 R.B.C.; 7,200 W.B.C.; Kahn negative; N.P.N. 41; B.S. 76; pressure 130/80 right arm, 144/90 left arm.

LUMBAR PUNCTURE: I.P. 140; dynamics normal; 15 cc. removed; F.P. 0; 2 W.B.C.; 0 R.B.C.; no Ross-Jones nor Pandy; protein 68 mg/100 cc.; gold sol 0001110000; Wasserman negative.

P... P...; Wt 150, 700; Ht 58; Age 48; White; Single.

DIAGNOSIS: Syringomyelia and Syringobulbia.

This patient was on this service three years ago when a diagnosis of syringomyelia and syringobulbia was made. Since that time there has been a growing sensation in the right anterior axillary region when the arm is extended, and at times a feeling of tightness in the back of the neck. The right hand has been pained several times without any definite sensation. There is numbness of both sides of the face and neck, the right more marked than the left, slight diplopia on looking to the right, hoarseness, a slight voice difficulty and some weakness of the right upper limb.

PHYSICAL EXAMINATION: Patient is well developed and well nourished, with good general health. The spine is deviated to the left and there is a palpable curvature of the right side of the pelvis.

NEUROLOGICAL EXAMINATION: There is rotary nystagmus of the right eye and diplopia on looking to the right. The tongue deviates to the left and pelvic movements are to the left. There are cerebellar signs and hyperactive deep reflexes of both upper limbs. There is almost complete analgesia and hypothermia over the right side of the face, left neck and upper two divisions of the left limb. Reflexes of the lower limbs are hyperactive with uncoordinated ankle clonus and a Babinski on the right.

URINE: Normal findings.

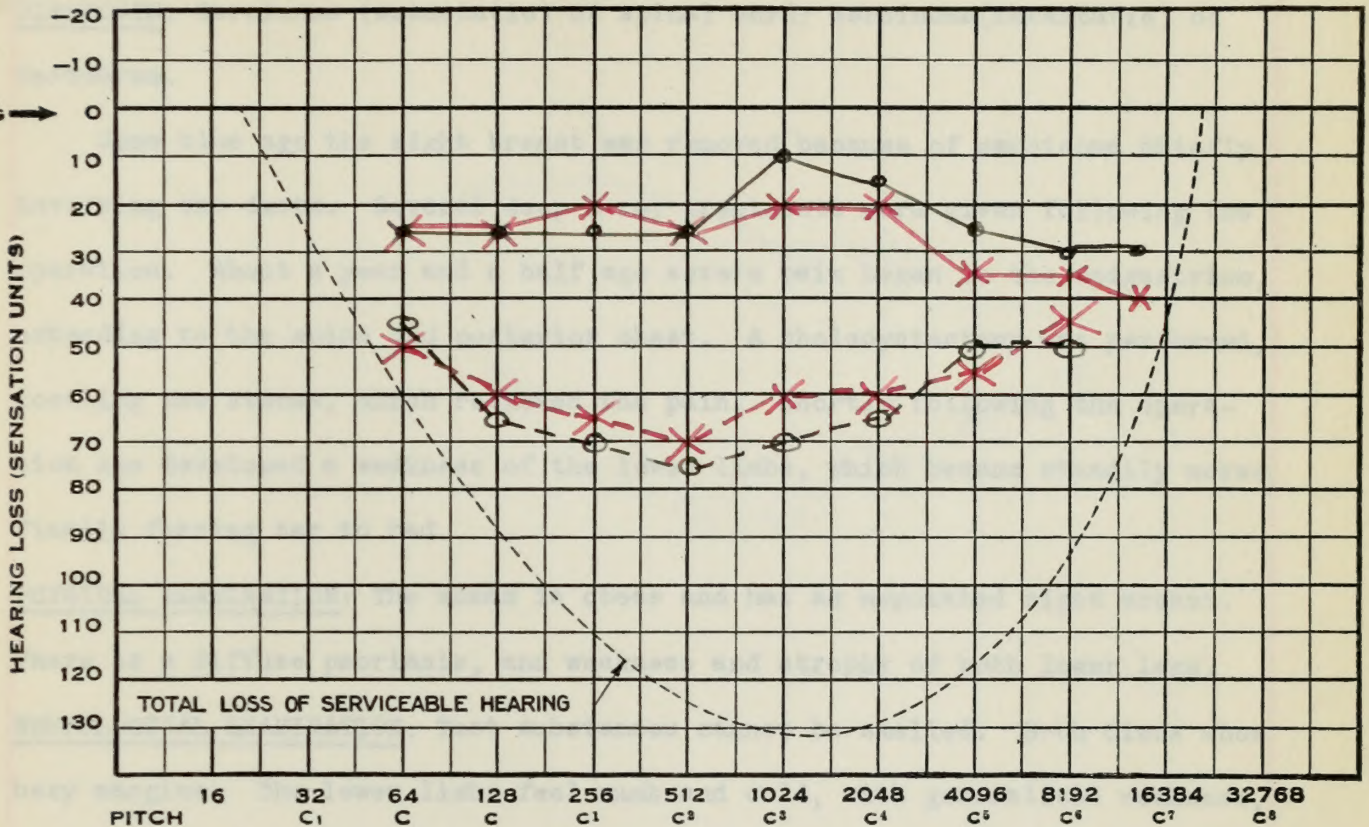
BLOOD: VES. neg.; 4,000,000 R.B.C.; 7,200 W.B.C.; E.S.R. 45; E.S. 75; pressure 130/80 right arm, 140/90 left arm.

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P. 140; 770. P. 140; 771. P. 140; 772. P. 140; 773. P. 140; 774. P. 140; 775. P. 140; 776. P. 140; 777. P. 140; 778. P. 140; 779. P. 140; 780. P. 140; 781. P. 140; 782. P. 140; 783. P. 140; 784. P. 140; 785. P. 140; 786. P. 140; 787. P. 140; 788. P. 140; 789. P. 140; 790. P. 140; 791. P. 140; 792. P. 140; 793. P. 140; 794. P. 140; 795. P. 140; 796. P. 140; 797. P. 140; 798. P. 140; 799. P. 140; 800. P. 140; 801. P. 140; 802. P. 140; 803. P. 140; 804. P. 140; 805. P. 140; 806. P. 140; 807. P. 140; 808. P. 140; 809. P. 140; 810. P. 140; 811. P. 140; 812. P. 140; 813. P. 140; 814. P. 140; 815. P. 140; 816. P. 140; 817. P. 140; 818. P. 140; 819. P. 140; 820. P. 140; 821. P. 140; 822. P. 140; 823. P. 140; 824. P. 140; 825. P. 140; 826. P. 140; 827. P. 140; 828. P. 140; 829. P. 140; 830. P. 140; 831. P. 140; 832. P. 140; 833. P. 140; 834. P. 140; 835. P. 140; 836. P. 140; 837. P. 140; 838. P. 140; 839. P. 140; 840. P. 140; 841. P. 140; 842. P. 140; 843. P. 140; 844. P. 140; 845. 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EVANS MEMORIAL

AUDIOGRAM

NAME A.R. 727796
DATE..... 19.....

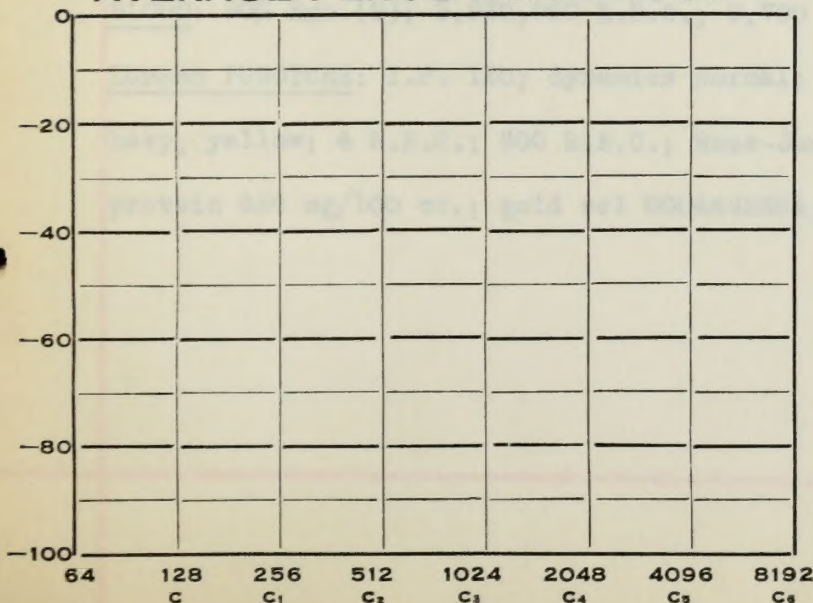


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber = at 4 Points

Disease.....
Duration.....
Chief Symptom.....
1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....
Right..... Left.....
Rinne $\frac{AC}{BC}$
Weber.....
Upper Limit.....
Lower Limit.....
Whisper.....
Voice.....

EVANS MEMORIAL

A... R...; #727,796; Female; Age 42; White; Married.

DIAGNOSIS: Carcinoma (metastatic) of spinal cord; carcinoma (metastatic) of vertebrae.

Some time ago the right breast was removed because of carcinoma chiefly involving the ducts. Several deep X-ray treatments were given following the operation. About a year and a half ago severe pain began in the epigastrium, extending to the spine and posterior chest. A cholecystectomy was performed, locating two stones, which relieved the pain. Shortly following the operation she developed a weakness of the lower limbs, which became steadily worse, finally forcing her to bed.

PHYSICAL EXAMINATION: The woman is obese and has an amputated right breast. There is a diffuse psoriasis, and weakness and atrophy of both lower legs.

NEUROLOGICAL EXAMINATION: Test substances cannot be smelled. Both discs show hazy margins. The lower limbs feel numb and cold, with generalized weakness, more on the left than on the right. There is hypesthesia, hypalgesia, hypothermesthesia and loss of vibration sense in both lower limbs. The knee jerk is absent on the left, both abdominals absent, bilateral Babinski and right ankle clonus.

URINE: Straw; acid; sp. gr. 1016; no sugar nor albumen; few W.B.C.

BLOOD: 90% Hgb.(S); 3,920,000 R.B.C.; 9,700 W.B.C.; Kahn negative; pr. 114/78.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 9 cc. removed; F.P. 0; appearance hazy, yellow; 4 W.B.C.; 800 R.B.C.; Ross-Jones and Pandy both positive; protein 456 mg/100 cc.; gold sol 0004445554; Wasserman negative.

A... R...; 4757, 795; Female; Age 42; White; Married.

DIAGNOSIS: Carcinoma (metastatic) of spinal cord; carcinoma (metastatic) of

vertebrae.

Some time ago the right breast was removed because of carcinoma chiefly involving the ducts. Several deep X-ray treatments were given following the operation. About a year and a half ago severe pain began in the epigastrium, extending to the spine and posterior chest. A cholecystectomy was performed, relieving two stones, which relieved the pain. Shortly following the operation she developed a weakness of the lower limbs, which became steadily worse, finally forcing her to bed.

PHYSICAL EXAMINATION: The woman is obese and has an atrophied right breast.

There is a diffuse gastralgia, and weakness and atrophy of both lower legs.

NEUROLOGICAL EXAMINATION: Test substances cannot be applied. Both limbs show very marked. The lower limbs feel numb and cold, with generalized weakness, more on the left than on the right. There is hypoaesthesia, hypalgnesia, hypothermoesthesia and loss of vibration sense in both lower limbs. The knee jerk is absent on the left, both adductors absent, bilateral Babinski and right

ankle clonus.

URINE: Straw; acid; sp. gr. 1.015; no sugar nor albumen; few W.B.C.

BLOOD: 50% Hb. (2); 5,250,000 R.B.C.; 5,700 W.B.C.; Kahn negative; pr. 114/78.

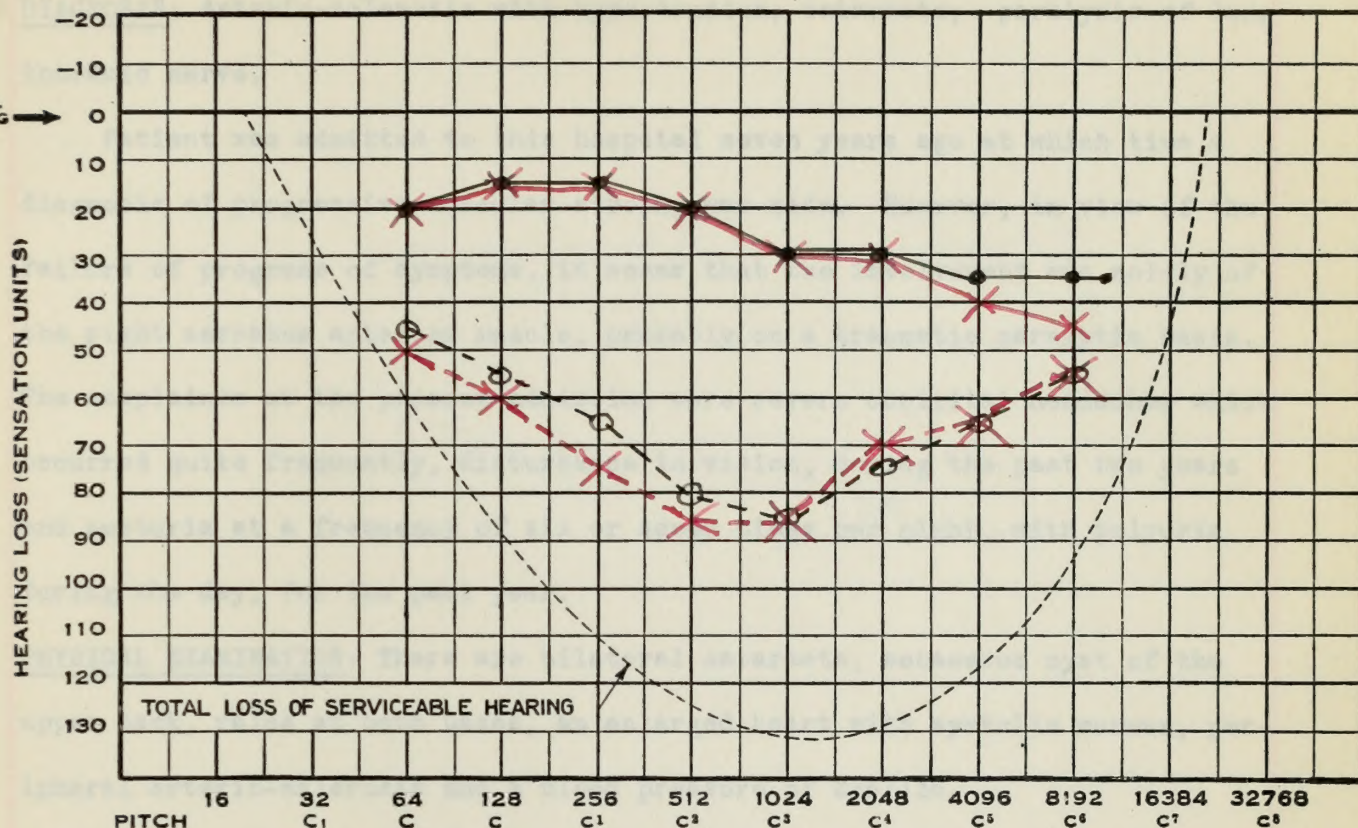
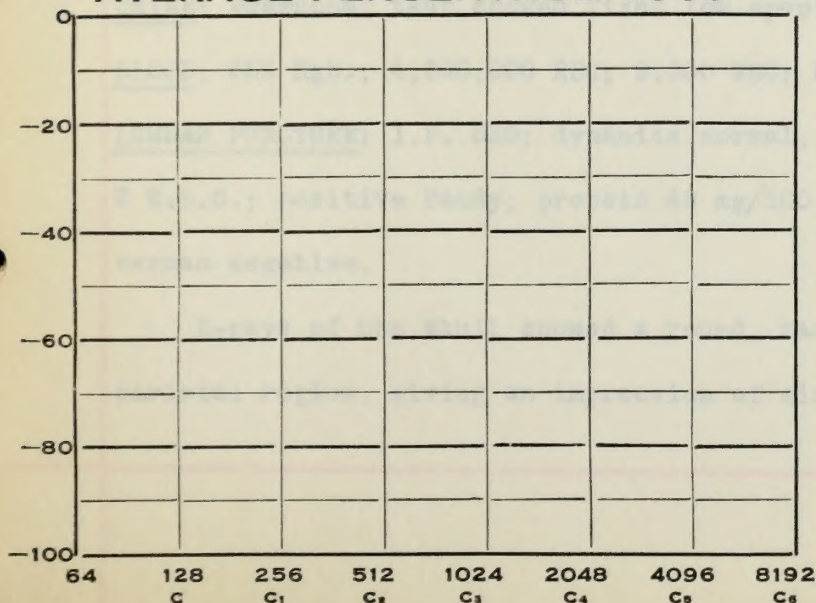
HEPATIC FUNCTIONS: I.P. 120; dynamics normal; W or. removed; W.B.C. appearance

gray, yellow; 4 W.B.C.; 800 R.B.C.; Rosen-Jones and Wandy both positive;

protein 4.50 mg/100 cc.; gold sol 000443254; Wassermann negative.

EVANS MEMORIAL**AUDIOGRAM**NAME D.N. 727548

DATE..... 19.....

**AVERAGE PERCENTAGE LOSS***Weber = at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

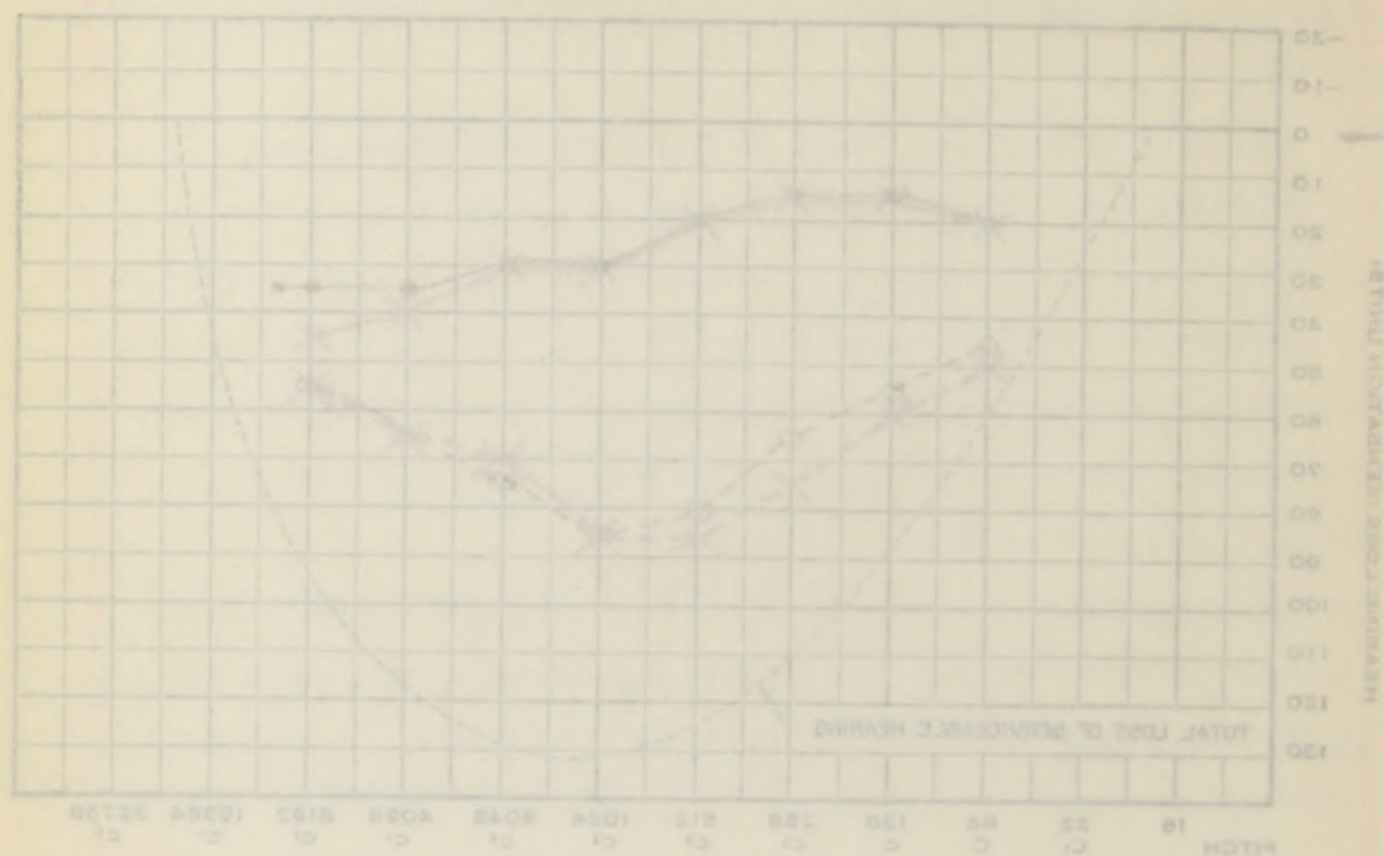
Voice

EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

19

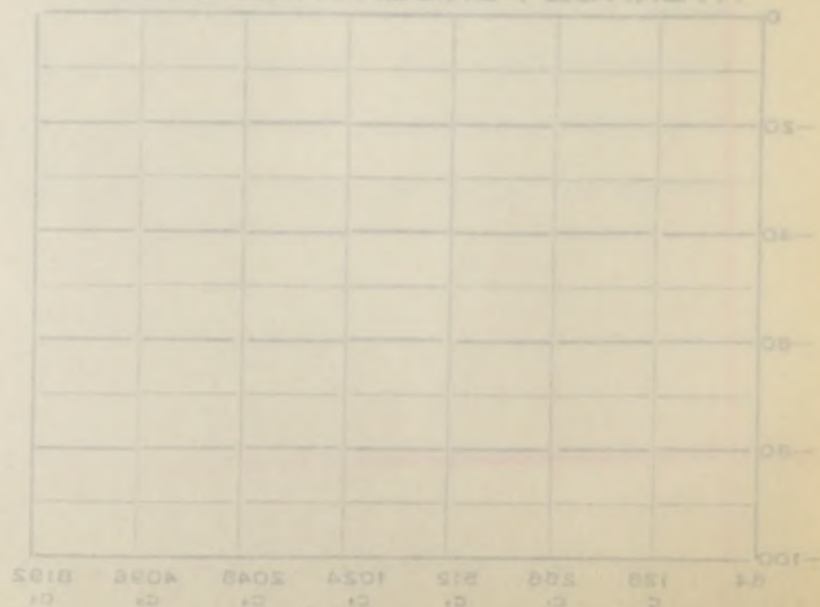


Frequency Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Diagnosis

Chief Complaint

1. Insidious

2. Pain

3. Itching

4. Tinnitus

5. Headache

6. Discharge

Right

Left

Time

Place

Upper Limit

Lower Limit

Weight

Volume

Weber = at 4 points

D... N...; #727,548; Male; Age 53; White; Married.

DIAGNOSIS: Arterio-sclerosis with hypertension; cataracts; paralysis of long thoracic nerve.

Patient was admitted to this hospital seven years ago at which time a diagnosis of progressive muscular atrophy was made. However, in view of the failure of progress of symptoms, it seems that the involvement was solely of the right serratus anterior muscle, probably on a traumatic paralytic basis. The complaints at the present admission were severe occipital headaches which occurred quite frequently, disturbance in vision, during the past two years and nocturia at a frequency of six or seven times per night, with polyuria during the day, for the past year.

PHYSICAL EXAMINATION: There are bilateral cataracts, sebaceous cyst of the upper back, rales at both bases, an enlarged heart with systolic murmur, peripheral arterio-sclerosis and a blood pressure of 226/136.

NEUROLOGICAL EXAMINATION: The optic fundi show papillitis with papilloedema with hemorrhagic area in the right fundus. The gait is slightly shuffling, with some weakness of the legs. Knee jerks, ankle jerks and deep arm reflexes were decreased on the left. The left foot seems slightly colder than the right and the right lobe of the thyroid larger than the left.

URINE: Mosenthal test showed fixed low specific gravity. Trace of albumen.

BLOOD: 85% Hgb.; 4,350,000 RBC; 9,300 WBC; Kahn negative; NPN 35; B.S. 92.

LUMBAR PUNCTURE: I.P. 320; dynamics normal; released fluid appeared normal; 3 W.B.C.; positive Pandy; protein 48 mg/100 cc.; gold sol 0012221000; Wasserman negative.

X-rays of the skull showed a round, radiant area in the left fronto-parietal region, giving an impression of single myeloma or axanthomatosis.

D... R...; 5727, 048; Male; Age 55; White; Married.

DIAGNOSIS: Arterio-sclerosis with hypertension; cataplexy; paralysis of long

thoracic nerve.

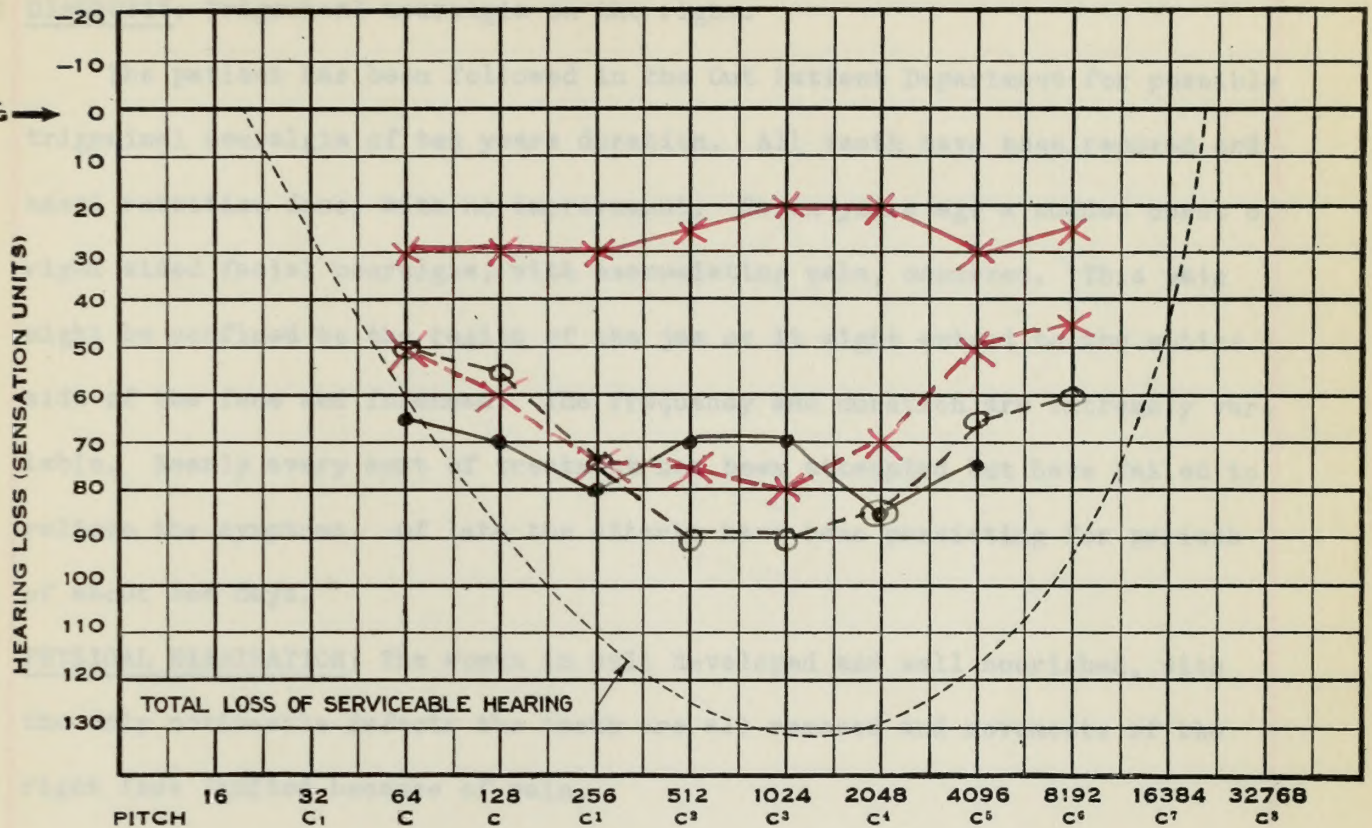
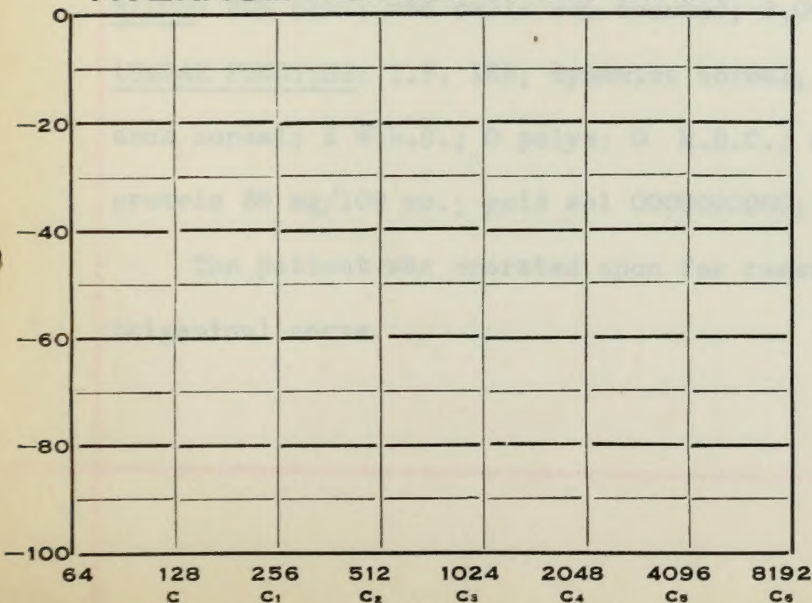
Patient was admitted to this hospital seven years ago at which time a diagnosis of progressive muscular atrophy was made. However, in view of the failure of progress of symptoms, it seems that the involvement was solely of the right thoracic anterior muscle, probably on a traumatic paralytic basis. The complaints at the present admission were severe cataplexy headaches which occurred quite frequently, disturbance in vision, during the past few years and nocturia at a frequency of six or seven times per night, with polyuria during the day, for the past year.

PHYSICAL EXAMINATION: There are bilateral cataplexy, cataplexy eyes of the upper back, ribs at both bases, an enlarged heart with systolic murmur, par-

thoracic arterio-sclerosis and a blood pressure of 120/120.
NEUROLOGICAL EXAMINATION: The optic fundi show papilloedema with hemorrhagic areas in the right fundus. The left is slightly shuffling, with some weakness of the left. Some jerks, some jerks and deep eye reflexes were described on the left. The left foot seems slightly colder than the right and the right lobe of the thyroid larger than the left.

LABORATORY: Hematological test showed fixed low specific gravity. Trace of albumen.
BLOOD: RBC: 4,350,000; HGB: 8.300; WBC: 8,300; ESR: 35; S.G. 32.
URINARY EXCRETION: 1.5. 320; dynamic normal; released fluid appeared normal;
S.W.G.: positive result; protein 45 mg/100 cc.; total 601231000; urea-
nitrogen negative.

X-rays of the skull showed a round, radiant area in the left frontal-parietal region, giving an impression of single cystoma or aneurysm.

EVANS MEMORIAL**AUDIOGRAM**NAME G.H. 705015
DATE 19**AVERAGE PERCENTAGE LOSS***Weber Left at 4 Points*Disease
Duration
Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

RightLeft

Rinne AC

BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

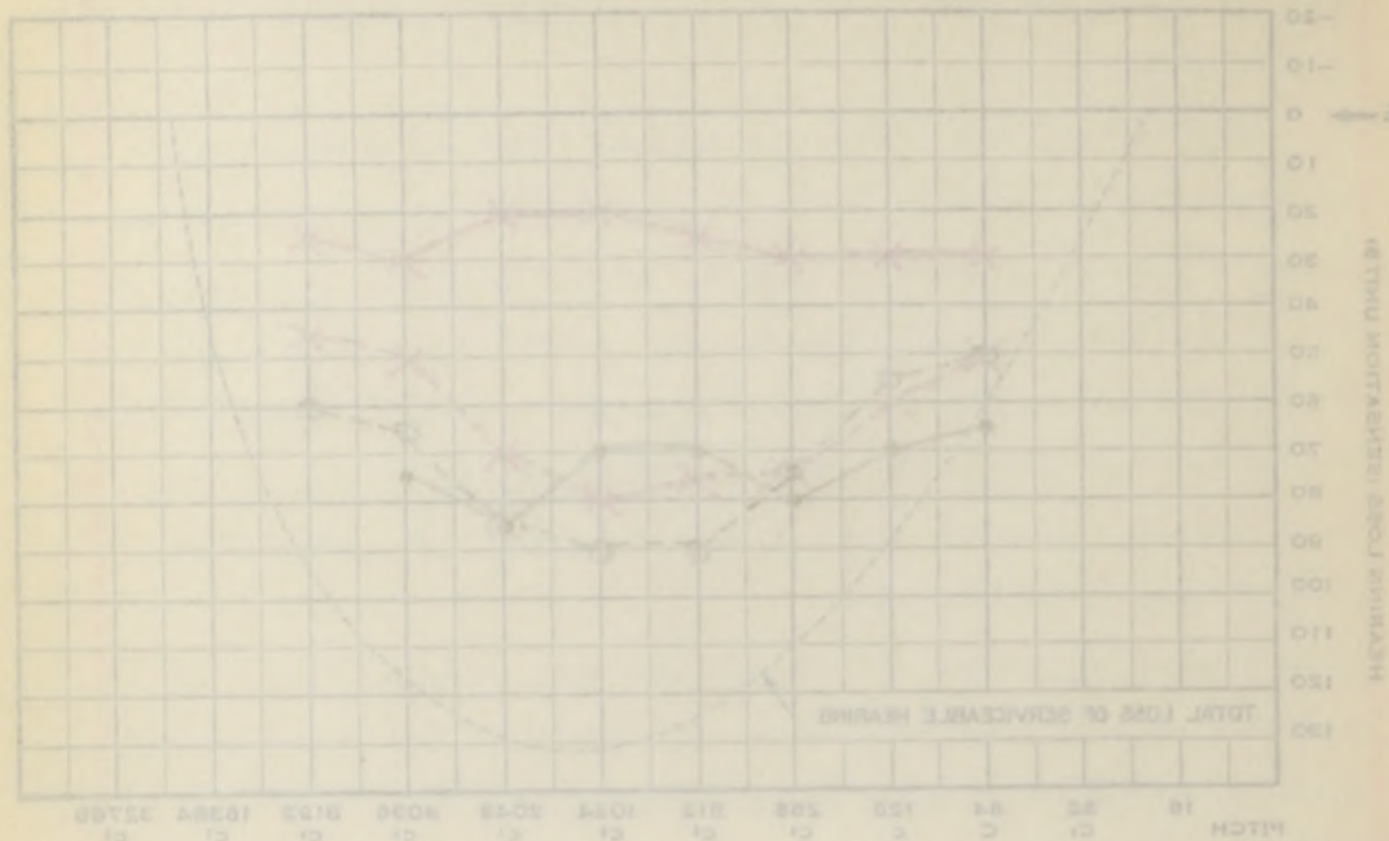
Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

19



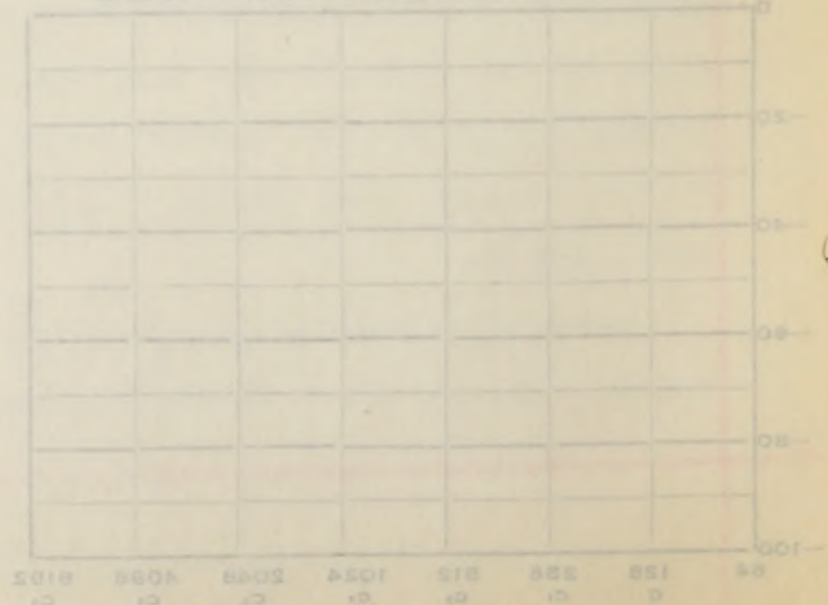
Percentage Hearing Loss

Right Ear

Left Ear

Weber Left at 4 points

AVERAGE PERCENTAGE LOSS



Right

Left

- Deafness
- Deafness
- Glue Ear
- 1. Deafness
- 2. Pain
- 3. Discharge
- 4. Tinnitus
- 5. Headache
- 6. Dizziness

Roar
Whistle
Upper Limit
Lower Limit
Whisper
Voice

G... H...; #705,015; Female; Age 37; White; Married.

DIAGNOSIS: Trigeminal neuralgia on the right.

The patient has been followed in the Out Patient Department for possible trigeminal neuralgia of ten years duration. All teeth have been removed and nasal resection done, with no improvement. Seven years ago a sudden onset of right sided facial neuralgia, with excruciating pain, occurred. This pain might be confined to the region of the jaw or it might extend to the entire side of the face and forehead. The frequency and duration are extremely variable. Nearly every sort of treatment has been attempted but have failed to relieve the symptoms. Of late the attacks have been persisting for periods of about ten days.

PHYSICAL EXAMINATION: The woman is well developed and well nourished, with the only noticeable defects the teeth are all removed and movements of the right face limited because of pain.

NEUROLOGICAL EXAMINATION: Both pupils are widely dilated and both conjunctivae are injected. Movements of the right side of face are limited because of excruciating pain. Hearing is impaired on the left for air conduction. Skinstroke and pilomotor test are positive.

URINE: Yellow; acid; sp. gr. 1010; no sugar nor albumen.

BLOOD: 80% Hgb.; red cells not counted; 8,000 W.B.C.; Kahn negative.

LUMBAR PUNCTURE: I.P. 125; dynamics normal; 10 cc. removed; F.P. 75; appearance normal; 2 W.B.C.; 0 polys; 0 R.B.C.; negative Ross-Jones and Pandey; protein 38 mg/100 cc.; gold sol 0000000000; Wasserman negative.

The patient was operated upon for resection of the sensory root of the trigeminal nerve.

G... H...; 4705.018; Female; Age 37; White; Married.

DIAGNOSIS: Trigeminal neuralgia on the right.

The patient has been followed in the Out Patient Department for possible trigeminal neuralgia of ten years duration. All teeth have been removed and sensory resection done, with no improvement. Seven years ago a sudden onset of right sided facial neuralgia, with excruciating pain, occurred. This pain might be confined to the region of the jaw or it might extend to the entire side of the face and forehead. The frequency and duration are extremely variable. Nearly every sort of treatment has been attempted but have failed to relieve the symptoms. Of late the attacks have been persisting for periods of about ten days.

PHYSICAL EXAMINATION: The woman is well developed and well nourished, with the only noticeable defect the teeth are all removed and movements of the right face limited because of pain.

NEUROLOGICAL EXAMINATION: Both pupils are widely dilated and both conjunctivae are injected. Movements of the right side of face are limited because of excruciating pain. Hearing is impaired on the left for air conduction. Blinking and pilomotor test are positive.

URINE: Yellow; acid; sp. gr. 1.010; no sugar nor albumen.

BLOOD: 800 Hgb.; red cells not counted; 4,000 W.B.C.; Kahn negative.

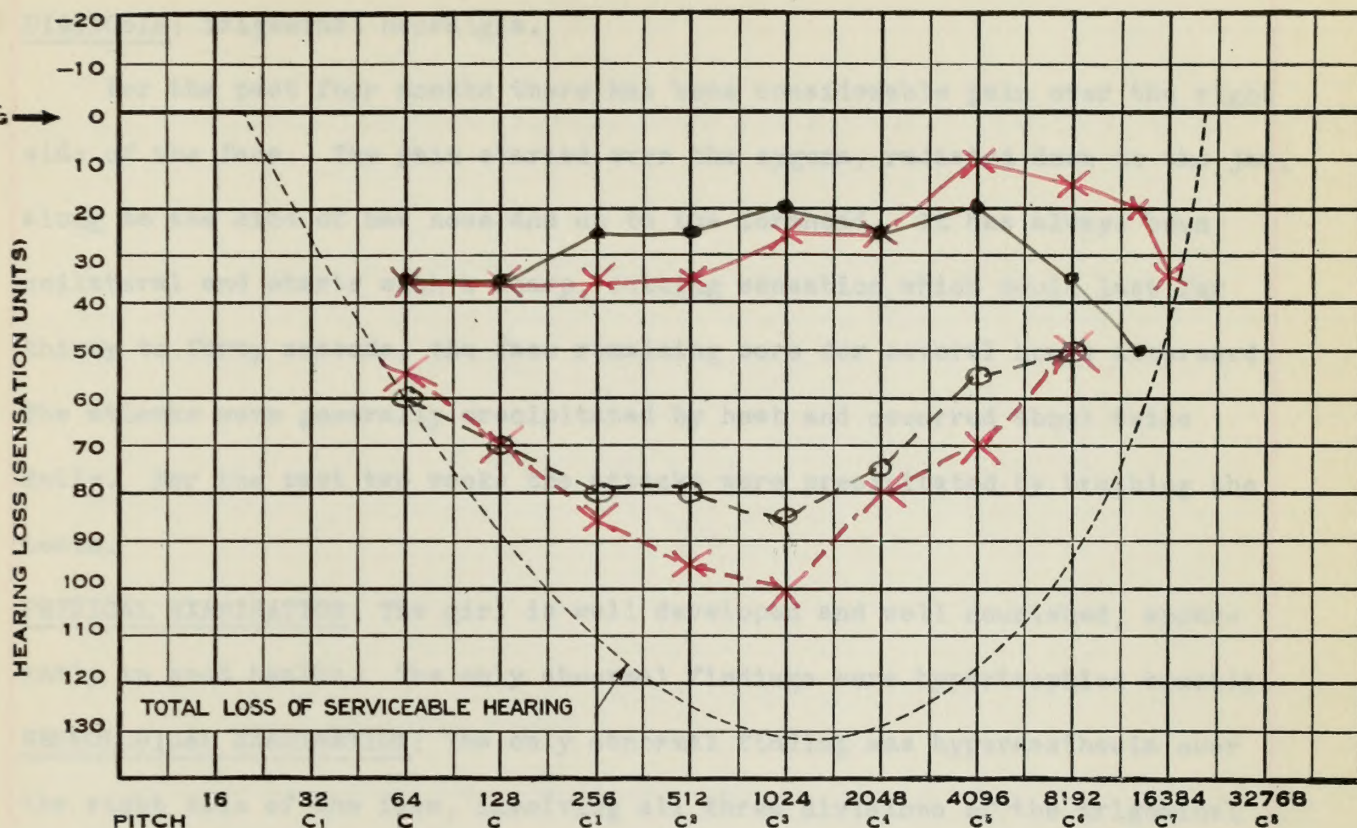
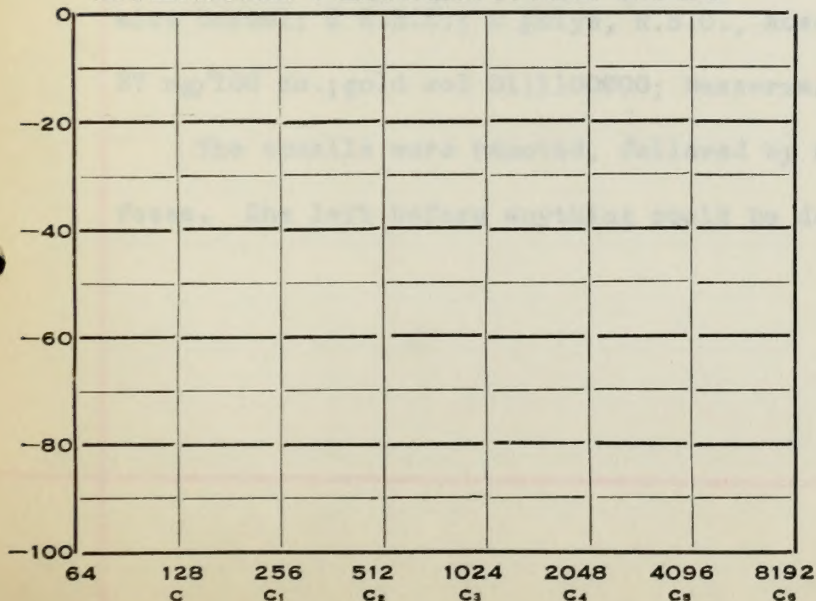
LUNGER FUNCTION: I.P. 125; dynamometer normal; 10 cc. removed; R.P. 75; apnea normal; 2 W.B.C.; 0 polys; 0 R.B.C.; negative Rosen-Hagen and Pandey.

Protein 38 mg/100 cc.; Gold and COOCCOCCOCCO; Wasserman negative.

The patient was operated upon for resection of the sensory root of the trigeminal nerve.

EVANS MEMORIAL**AUDIOGRAM**NAME M. A. M. 743709

DATE.....19.....

*Weber Left at 4 Points***AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit

Lower Limit

Whisper

Voice

M... M...; #743,709; Female; Age 19; White; Single.

DIAGNOSIS: Trigeminal neuralgia.

For the past four months there has been considerable pain over the right side of the face. The pain started over the zygoma, radiated down to the jaw, along to the side of her nose and up to the forehead. It has always been unilateral and starts with a sharp, cutting sensation which would last for thirty to forty seconds, the face remaining sore for several hours afterward. The attacks were generally precipitated by heat and occurred about twice daily. For the past two weeks the attacks were precipitated by brushing the teeth.

PHYSICAL EXAMINATION: The girl is well developed and well nourished, apparently in good health. The only abnormal findings were hypertrophied tonsils.

NEUROLOGICAL EXAMINATION: The only abnormal finding was hyperaesthesia over the right side of the face, involving all three divisions of the trigeminal nerve.

URINE: Amber; cloudy; acid; sp. gr. 1026; no sugar nor albumen.

BLOOD: 90% Hgb.; 4,500,000 R.B.C.; 6,400 W.B.C.; Kahn negative; pressure 110/70.

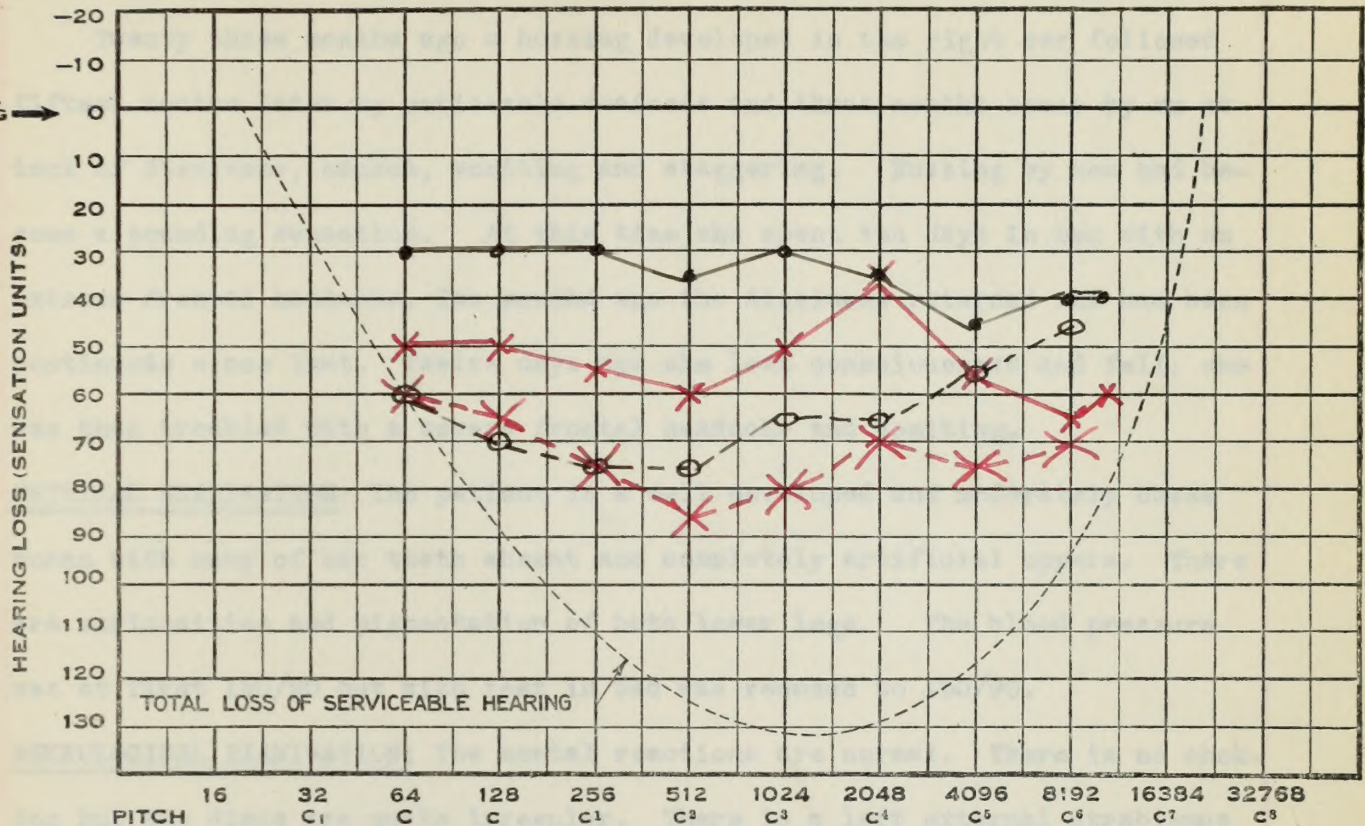
LUMBAR PUNCTURE: I.P. 95; dynamics normal; 15 cc. removed; F.P. 60; appearance normal; 2 W.B.C.; 0 polys, R.B.C., Ross-Jones nor Pandy; protein 27 mg/100 cc.; gold sol 0111100000; Wasserman negative.

The tonsils were removed, followed by a large clot in the right tonsillar fossa. She left before anything could be done for the trigeminal neuralgia.

EVANS MEMORIAL

AUDIOGRAM

NAME K. K. 733457
DATE 19

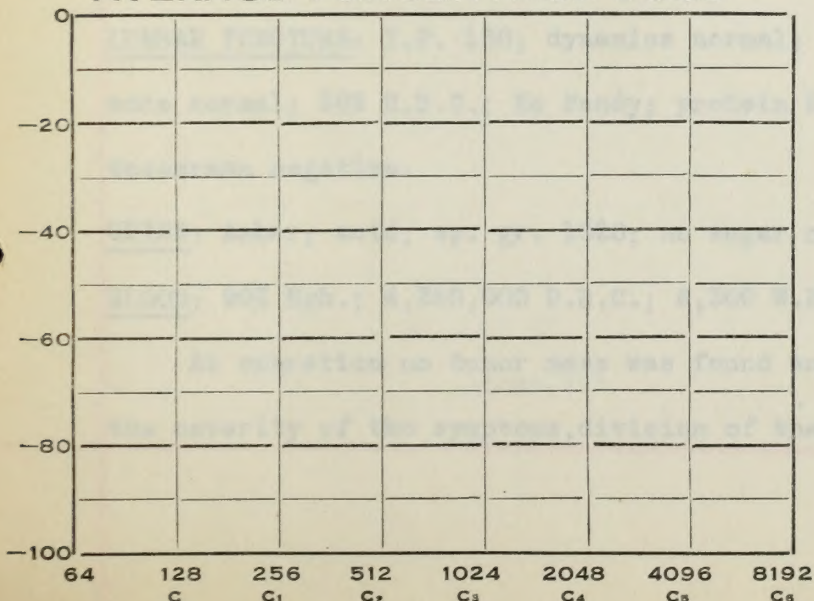


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber ? = { Nose bridge
Chin
Vertex
Right at Forehead.

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

Right

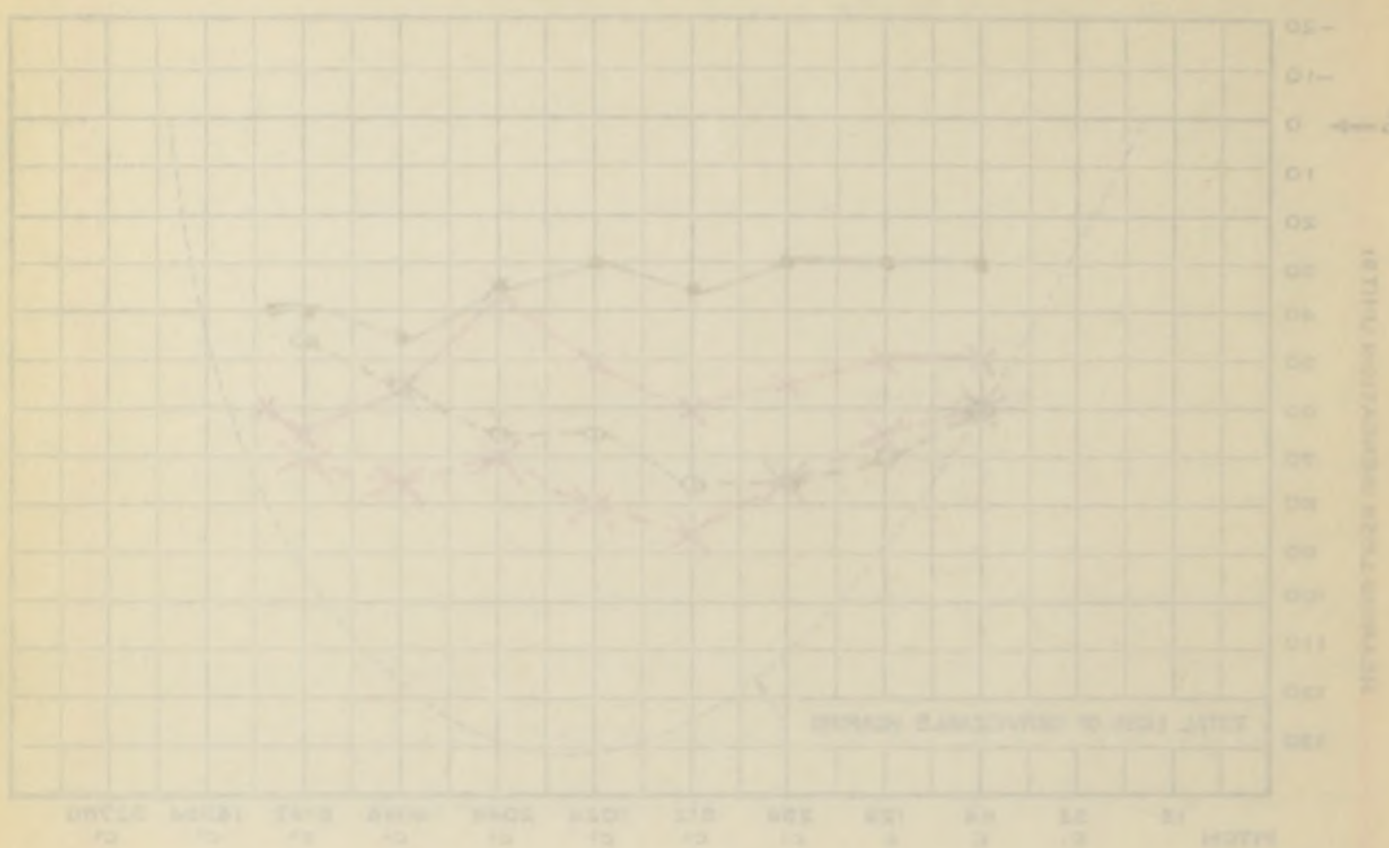
Left

..... Rinne AC
..... BC
..... Weber
..... Upper Limit.....
..... Lower Limit.....
..... Whisper.....
..... Voice.....

EYAS MEMORIAL

AUDIOGRAM

NAME K. K.
DATE 7/3/47



C...K...; #733,457; Female; Age 45; White; Married.

DIAGNOSIS: Eighth nerve neuralgia - right (Meuniere's syndrome).

Twenty three months ago a buzzing developed in the right ear followed fifteen months later by noticeable deafness and three months hence by an attack of dizziness, nausea, vomiting and staggering. Buzzing by now had become a pounding sensation. At this time she spent ten days in bed with an extreme frontal headache. Two months ago the dizziness returned and has been continuous since that. Twelve days ago she lost consciousness and fell; she was then troubled with a severe frontal headache and vomiting.

PHYSICAL EXAMINATION: The patient is a well developed and moderately obese woman with many of her teeth absent and completely artificial uppers. There are varicosities and pigmentation of both lower legs. The blood pressure was at first 150/90 but with rest in bed was reduced to 130/90.

NEUROLOGICAL EXAMINATION: The mental reactions are normal. There is no choking but the discs are quite irregular. There is a left external strabismus and double vision occurs when looking to lower left quadrant with both eyes. Complains of vertigo and walks with a staggering gait. Knee jerk is diminished on the left and no ankle jerk could be elicited. The visual acuity is almost zero in the left eye. Caloric tests reveal bilateral involvement of both vestibular nerves; rechecked with the same results.

LUMBAR PUNCTURE: I.P. 160; dynamics normal; 12 cc. removed; F.P. 110; appearance normal; 282 R.B.C.; No Pandy; protein 51 mg/100 cc.; gold sol 0000000000; Wasserman negative.

URINE: Amber; acid; sp. gr. 1026; no sugar nor albumen.

BLOOD: 90% Hgb.; 4,250,000 R.B.C.; 6,300 W.B.C.; N.P.N. 27; Kahn negative.

At operation no tumor mass was found and it was felt that, in view of the severity of the symptoms, division of the eighth nerve was warranted.

At operation no tumor mass was found and it was felt that, in view of the severity of the symptoms, division of the eighth nerve was warranted.

BLOOD: 50% Hgb.; 4,250,000 R.B.C.; 5,300 W.B.C.; W.B.R. 27; Kahn negative.

URINE: Amber; acid; sp. gr. 1.026; no sugar nor albumen.

WASSERMANN: Negative.

SERUM: Normal; 282 R.B.C.; No Pandey; Protein 51 mg/100 cc.; Gold set 0000000000.

MUSCULAR FUNCTION: I.P. 160; dynamics normal; IS cc. removed; P.P. 110; apparent both vestibular nerves; rechecked with the same results.

NEUROLOGICAL EXAMINATION: The mental reactions are normal. There is no shaking but the discs are quite irregular. There is a left external strabismus and double vision occurs when looking to lower left quadrant with both eyes. Complaints of vertigo and walks with a staggering gait. Knee jerk is diminished on the left and no ankle jerk could be elicited. The visual acuity is almost zero in the left eye. Oculic tests reveal bilateral involvement of both vestibular nerves; rechecked with the same results.

PHYSICAL EXAMINATION: The patient is a well developed and moderately obese woman with many of her teeth absent and completely atrophic upper. There are varicosities and pigmentation of both lower legs. The blood pressure was at first 180/90 but with rest in bed was reduced to 130/90.

DIAGNOSIS: The patient is a well developed and moderately obese woman with many of her teeth absent and completely atrophic upper. There are varicosities and pigmentation of both lower legs. The blood pressure was at first 180/90 but with rest in bed was reduced to 130/90.

Twenty three months ago a burning developed in the right ear followed fifteen months later by noticeable deafness and three months hence by an attack of dizziness, nausea, vomiting and staggering. Suffering by now had become a pounding sensation. At this time the patient ran days in bed with an extreme frontal headache. Two months ago the dizziness returned and has been continued since that. Twelve days ago she lost consciousness and fell; she was then troubled with a severe frontal headache and vomiting.

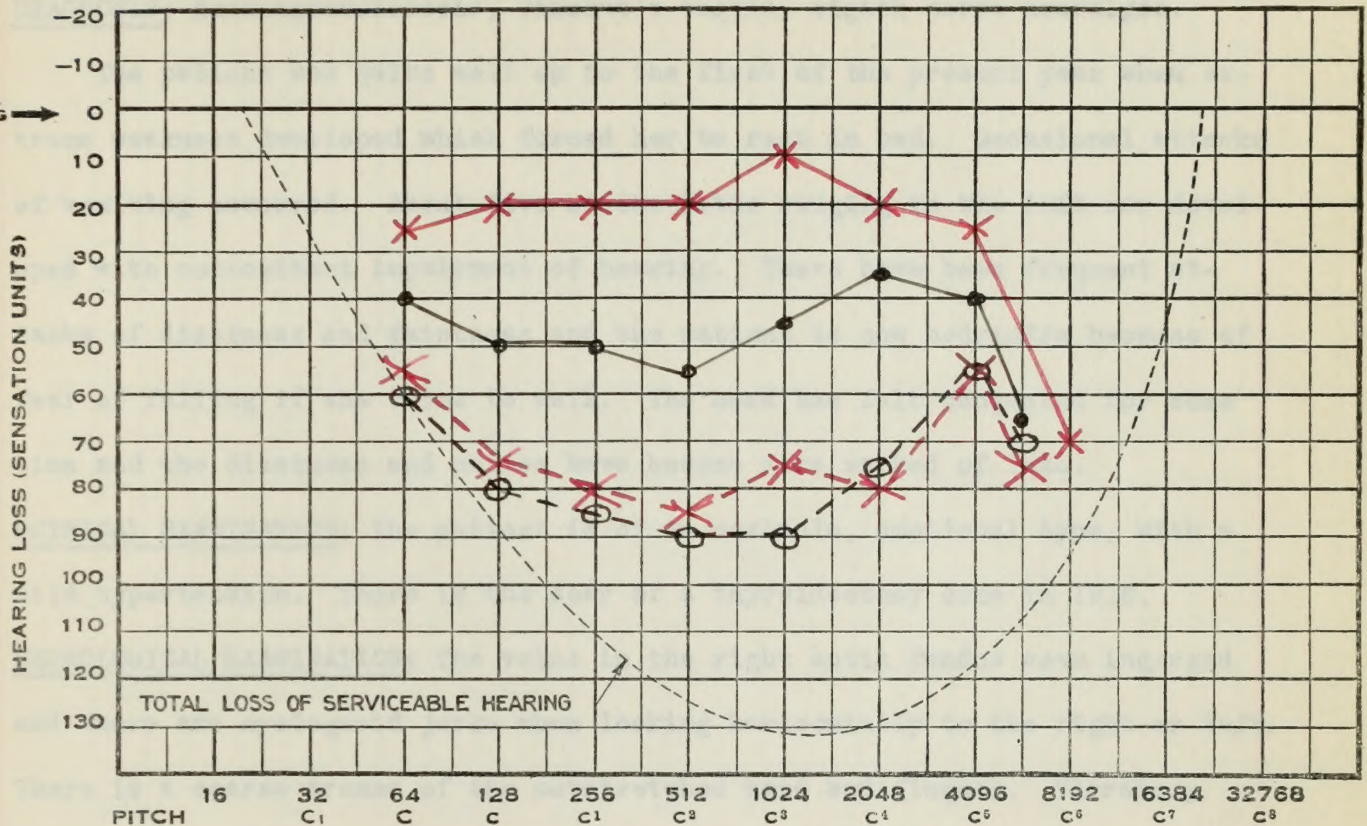
DIAGNOSIS: Eighth nerve neuritis - right (Hunt's syndrome).

C...K...; 5735, 457; Female; Age 45; White; Married.

EVANS MEMORIAL

AUDIOGRAM

NAME N.G. 720904
DATE 19.....

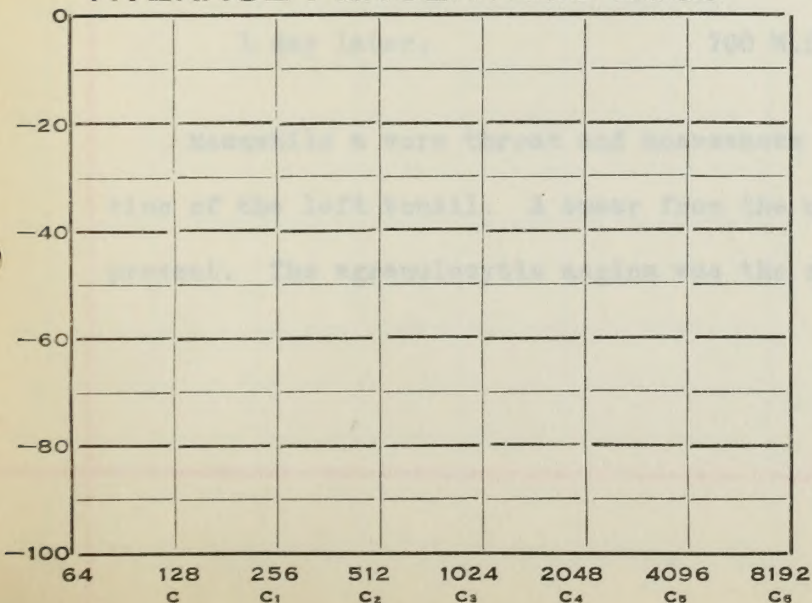


Percentage Hearing Loss

Right Ear
Left Ear

Weber Right at 4 Points

AVERAGE PERCENTAGE LOSS



Disease
Duration
Chief Symptom.....
1. Deafness.....
2. Pain
3. Discharge.....
4. Tinnitus
5. Headache
6. Dizziness.....
Right Left
..... Rinne AC
..... BC
..... Weber
..... Upper Limit.....
..... Lower Limit.....
..... Whisper.....
..... Voice.....

ETATS MEMORIAL

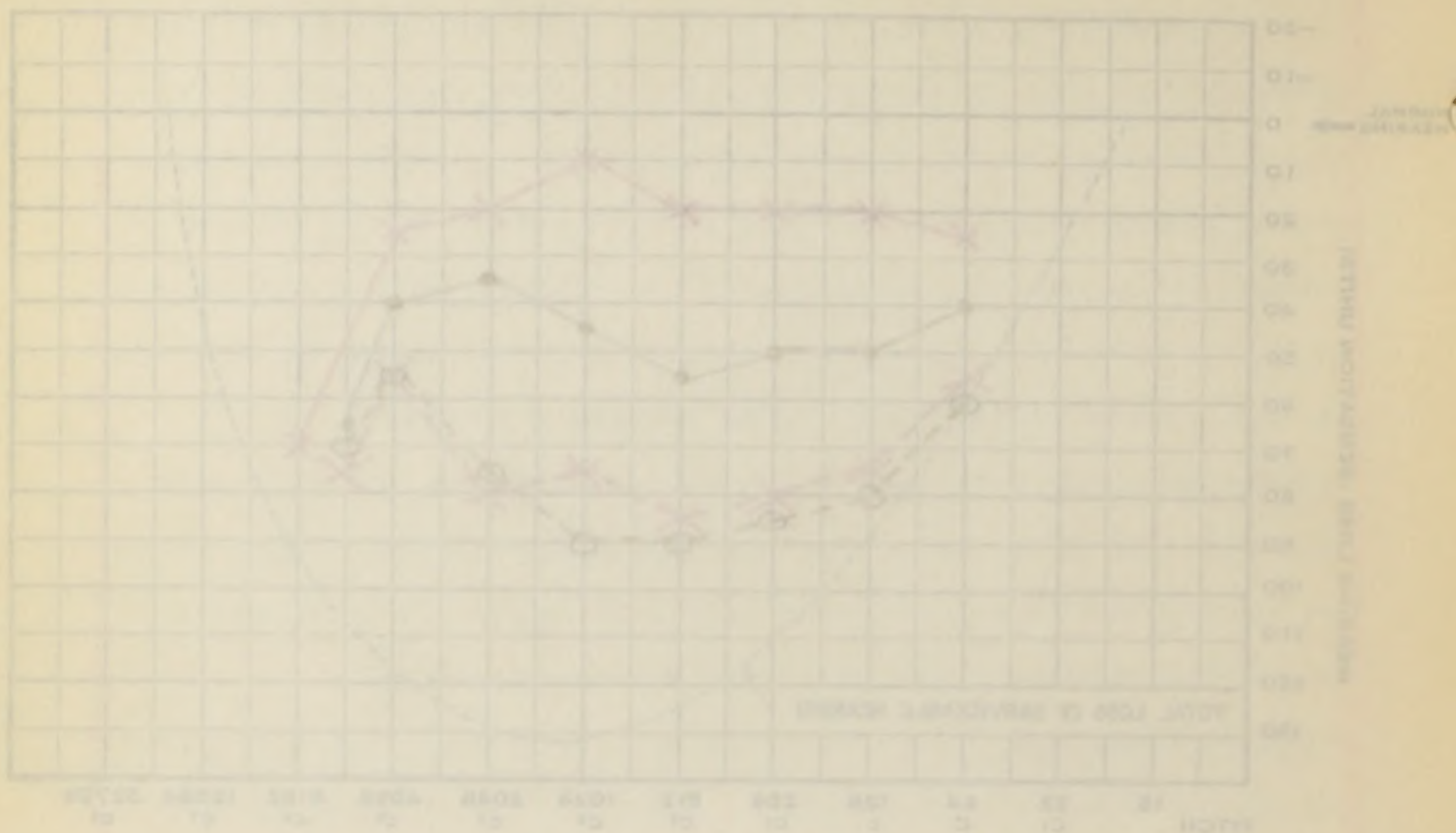
720204

W.G.

NAME

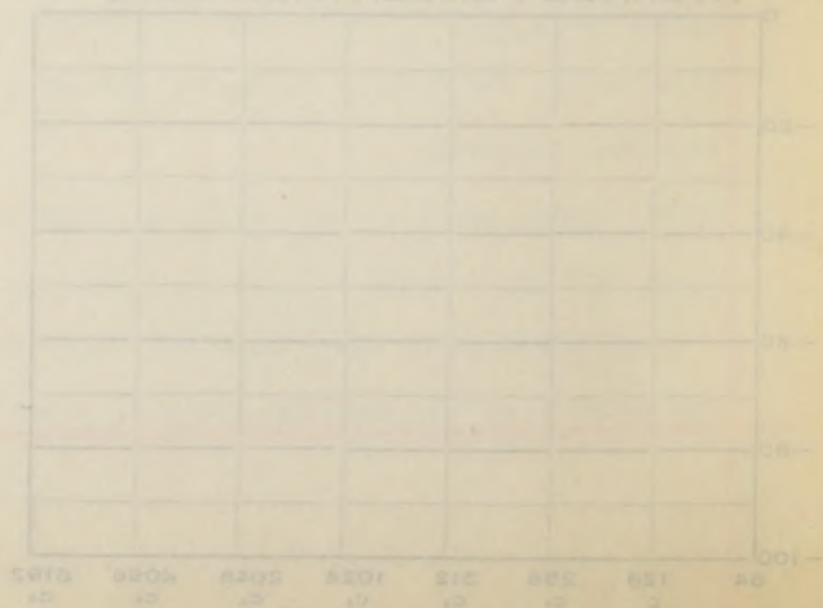
AUDIOGRAM

DATE



We per Right of H Points

AVERAGE PERCENTAGE LOSS



Name _____
 Date _____
 Unit _____
 1. Location _____
 2. Type _____
 3. Material _____
 4. Finish _____
 5. Location _____
 6. Material _____
 7. Finish _____
 8. Location _____
 9. Material _____
 10. Finish _____
 11. Location _____
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 94. Finish _____
 95. Location _____
 96. Material _____
 97. Finish _____
 98. Location _____
 99. Material _____
 100. Finish _____

N...G...; #720,904; Female; Age 54; White; Single.

DIAGNOSIS: Acute agranulocytosis, Vincent's angina, eighth nerve neuralgia.

The patient was quite well up to the first of the present year when extreme weakness developed which forced her to rest in bed. Occasional attacks of vomiting occurred. About five months later ringing in the left ear developed with concomitant impairment of hearing. There have been frequent attacks of dizziness and faintness and the patient is now bedridden because of fear of falling if she tries to walk. The head has felt congested for some time and the dizziness and noises have become more marked of late.

PHYSICAL EXAMINATION: The patient is of an unstable, emotional type, with a mild hypertension. There is the scar of a thyroidectomy done in 1918.

NEUROLOGICAL EXAMINATION: The veins in the right optic fundus seem ingorged and there are nystagmoid jerks when looking horizontally to the right or left. There is a coarse tremor of the outstretched hand and fingers. Vibratory sense is diminished in both lower extremities. Caloric tests show a possible slight impairment on the left side.

URINE: Yellow; acid; sp. gr. 1016; no sugar nor albumen.

BLOOD: 85% Hgb.; 4,250,000 R.B.C.; 8,400 W.B.C.; Kahn negative; pr. 158/102.

17 days later:

800 W.B.C.; no polymorphonuclears

1 day later:

(no polymorphonuclears
700 W.B.C.; (
(3% lymphocytes.

Meanwhile a sore throat and hoarseness developed followed by ulceration of the left tonsil. A smear from the ulcer showed Vincent's organisms present. The agranulocytis angina was the real cause leading to death.

H...G...: 4720, 804; Female; Age 54; White; Single.

DIAGNOSIS: Acute myeloid leukemia, Vincent's angina, right nerve neuritis.

The patient was quite well up to the first of the present year when extreme weakness developed which forced her to rest in bed. Occasional attacks of vomiting occurred. About five months later ringing in the left ear developed with consequent impairment of hearing. There have been frequent attacks of dizziness and faintness and the patient is now bedridden because of fear of falling if she tries to walk. The head has felt congested for some time and the dizziness and noises have become more marked of late.

PHYSICAL EXAMINATION: The patient is of an unstable, emotional type, with a mild hypertension. There is the scar of a thyroidectomy done in 1918.

NEUROLOGICAL EXAMINATION: The veins in the right optic fundus were engorged and there are nystagmoid jerks when looking horizontally to the right or left. There is a coarse tremor of the outstretched hand and fingers. Vibratory sense is diminished in both lower extremities. Caloric tests show a possible slight impairment on the left side.

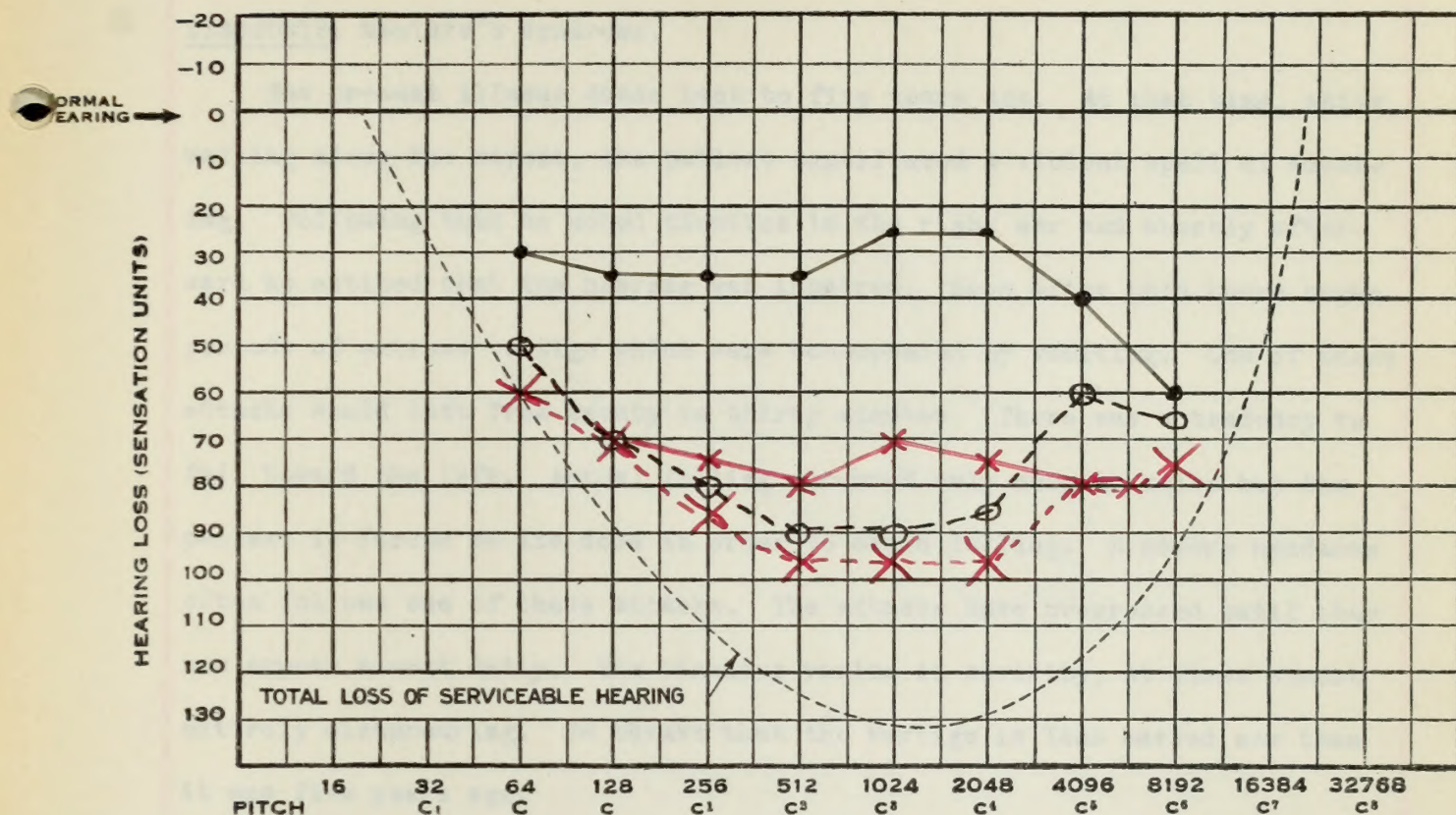
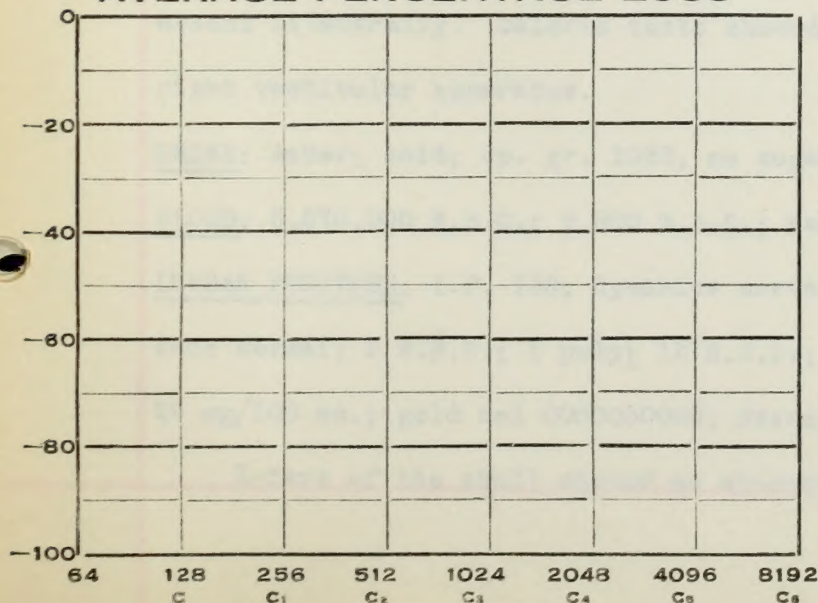
URINE: Yellow; solid; sp. gr. 1012; no sugar nor albumen.

BLOOD: 825 Hgb.; 4,350,000 R.B.C.; 8,400 W.B.C.; Kahn negative; pr. 188/102.

17 days later: 800 W.B.C.; no polymorphonuclears

1 day later: 700 W.B.C.; (no polymorphonuclears)
(3% lymphocytes).

Meanwhile a sore throat and hoarseness developed followed by ulceration of the left tonsil. A smear from the ulcer showed Vincent's organisms present. The agranulocytosis angina was the real cause leading to death.

EVANS MEMORIAL**AUDIOGRAM**NAME R. T. M. 714 257
DATE..... 19.....**AVERAGE PERCENTAGE LOSS***Weber Left at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne $\frac{AC}{BC}$

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

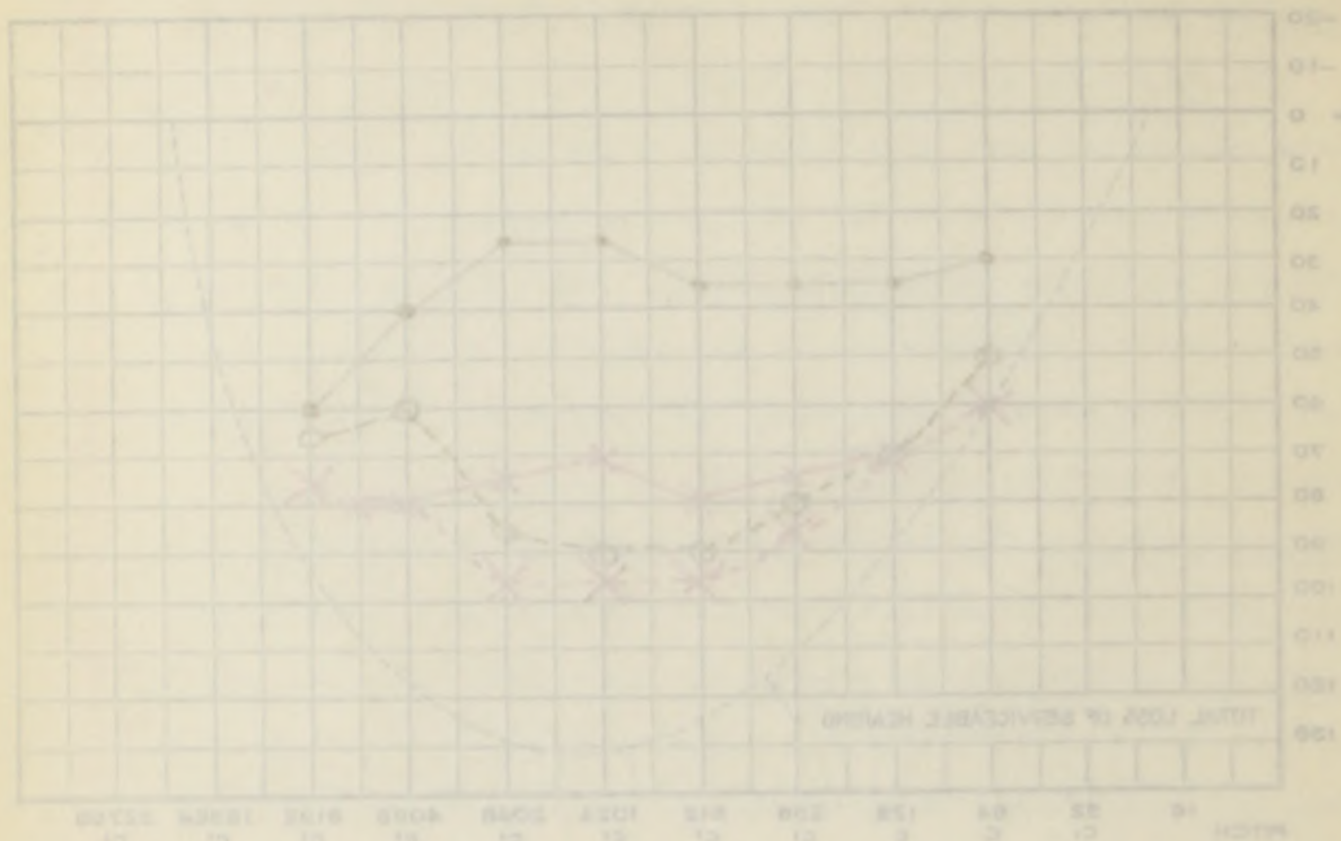
ETATS MEMORIAL

714327

R.T.M.

NAME
DATE

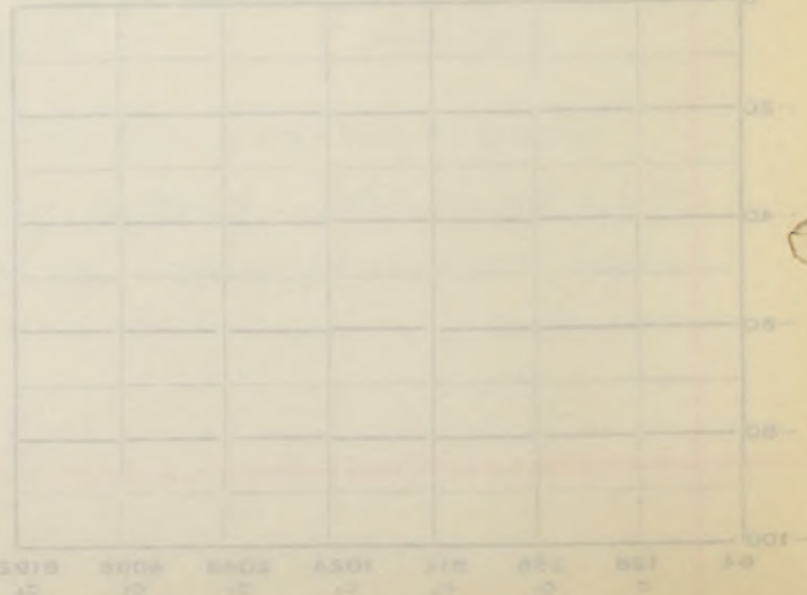
AUDIOGRAM



Intensity Hearing Loss
Right Ear
Left Ear

Weber Left at 4 points

AVERAGE PERCENTAGE LOSS



- 1. Right
- 2. Left
- 3. Average
- 4. Weber
- 5. Speech
- 6. Distance

Right
Left
Average
Weber
Speech
Distance

EVANS MEMORIAL

R... T... M...; #714,257; Male; Age 57; White; Married.

DIAGNOSIS: Meniere's syndrome.

The present illness dates back to five years ago. At that time, while walking along the street, the patient experienced a violent spell of sneezing. Following this he noted tinnitus in the right ear and shortly afterward he noticed that the hearing was impaired. Soon after this there began periods of extreme vertigo which were accompanied by vomiting. One of these attacks would last from twenty to thirty minutes. There was a tendency to fall toward the left. Actual falling occurred only once or twice but the patient is forced to lie down in order to avoid falling. A severe headache often follows one of these attacks. The attacks have progressed until they now appear almost daily. The tinnitus varies in severity, at times almost entirely disappearing. He thinks that the vertigo is less marked now than it was five years ago.

PHYSICAL EXAMINATION: The patient is a plathoric type of individual, with essentially normal findings except for slight dyspnea for the past year.

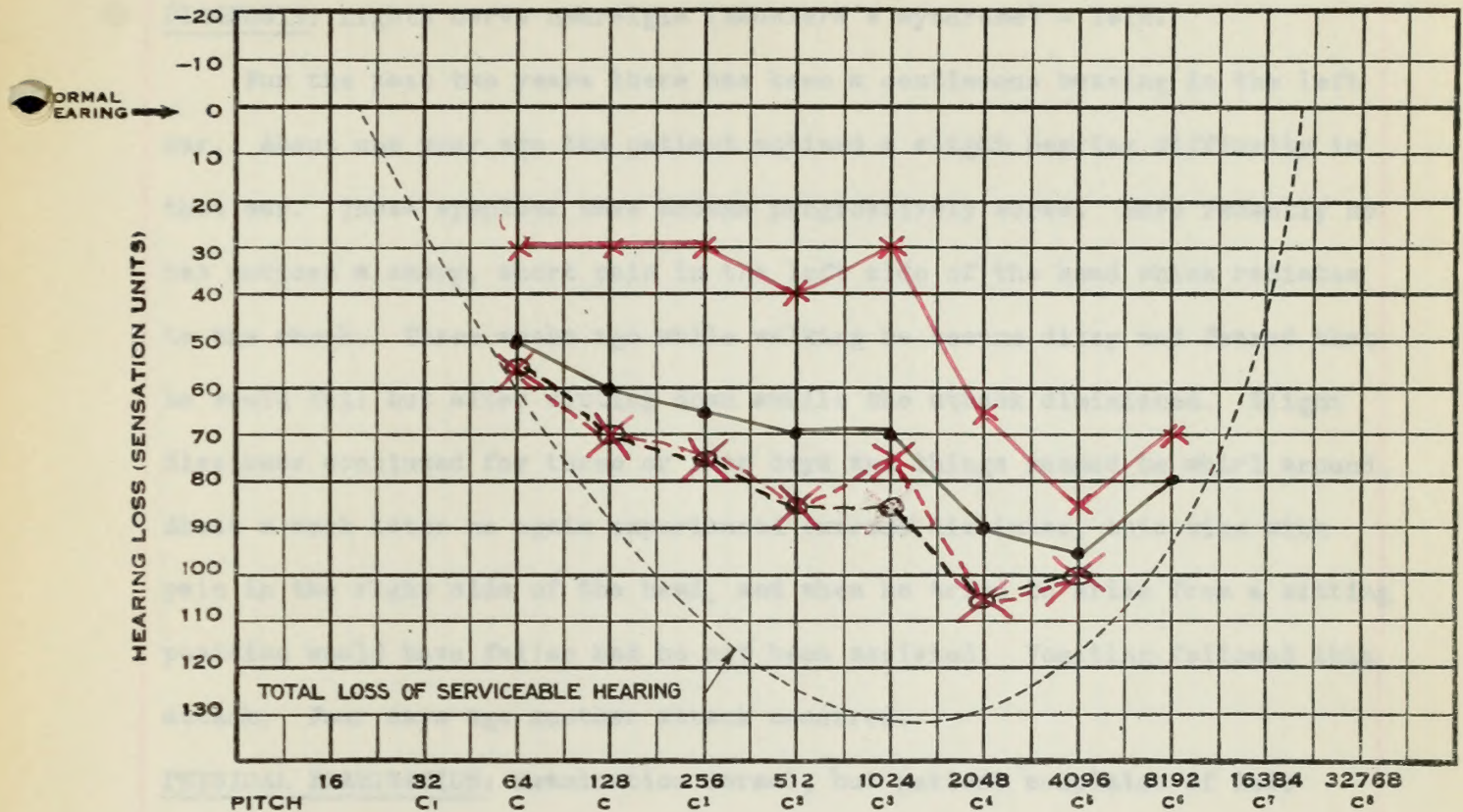
NEUROLOGICAL EXAMINATION: The pupils were irregular but reacted normally. There is a questionable weakness of the lower left face. The reflexes are slightly hyperactive on the left, while the abdominals and cremasterics are absent bilaterally. Caloric tests showed possible slight impairment of the right vestibular apparatus.

URINE: Amber; acid; sp. gr. 1023; no sugar nor albumen.

BLOOD: 5,570,000 R.B.C.; 8,800 W.B.C.; Kahn negative.

LUMBAR PUNCTURE: I.P. 130; dynamics normal; 15 cc. removed; F.P. 60; appearance normal; 2 W.B.C.; 1 poly; 12 R.B.C.; no Ross-Jones nor Pandy; protein 29 mg/100 cc.; gold sol 0000000000; Wasserman negative.

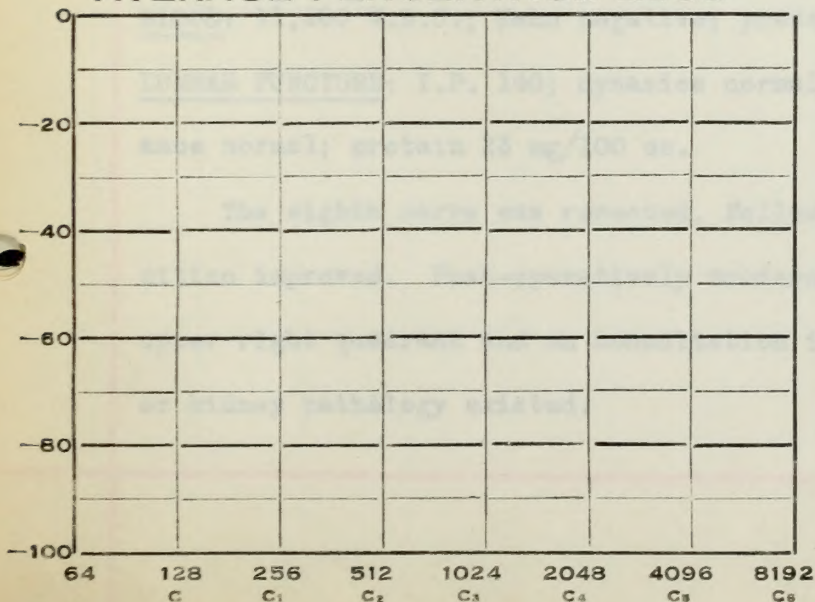
X-rays of the skull showed no abnormalities.

EVANS MEMORIAL**AUDIOGRAM**NAME F. L. 721387
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber Right at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne $\frac{AC}{BC}$

Weber

Upper Limit

Lower Limit

Whisper

Voice

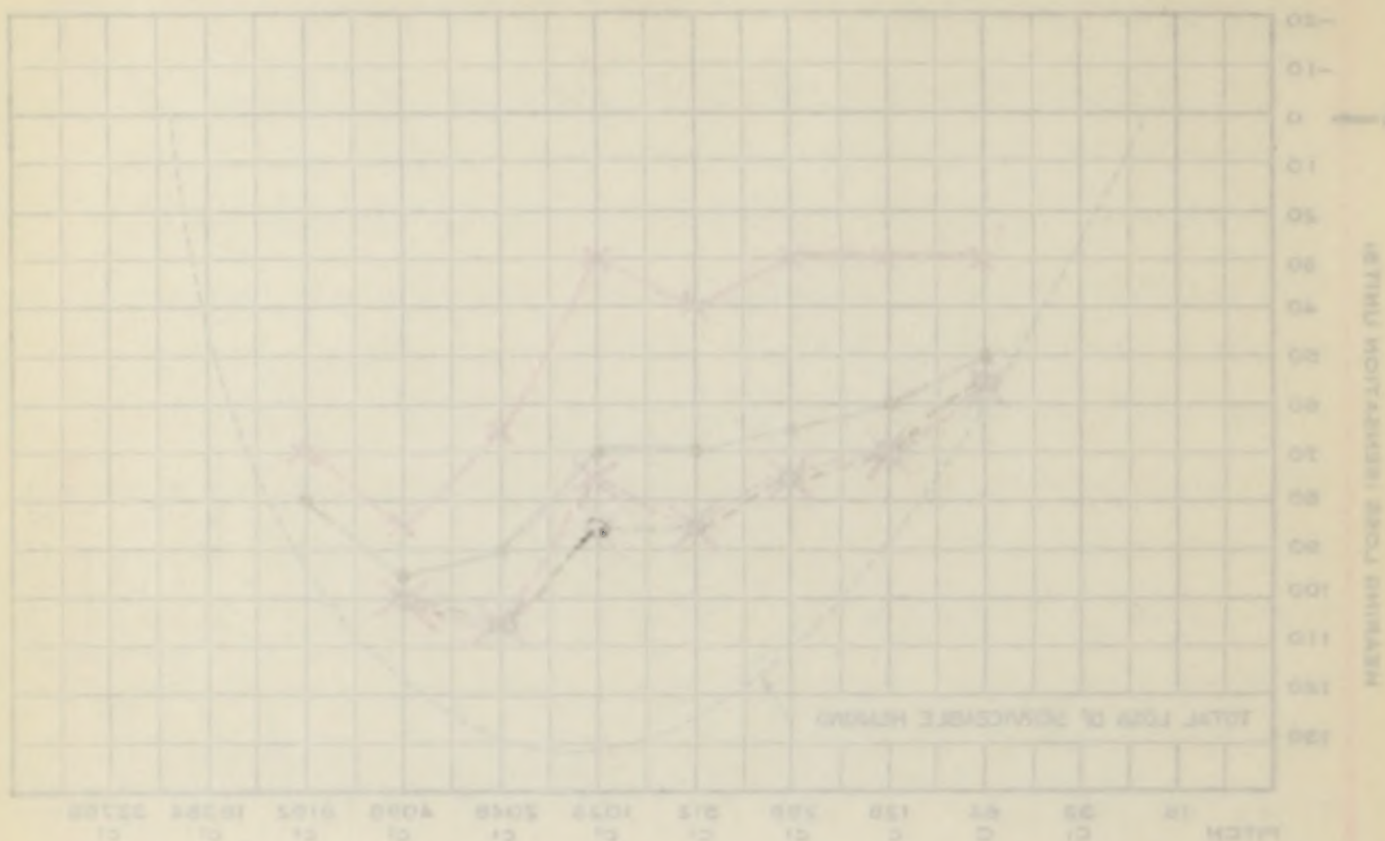
EVANS MEMORIAL

AUDIOGRAM

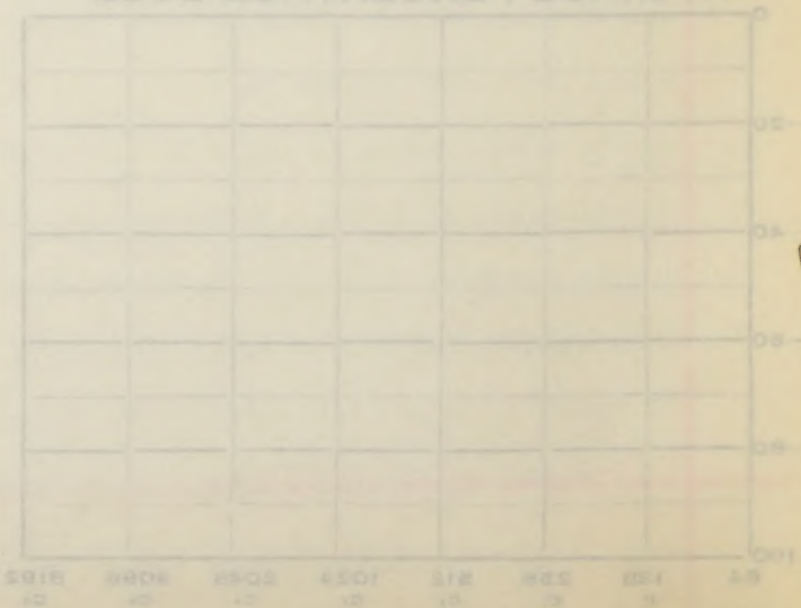
NAME
DATE

721387

19



AVERAGE PERCENTAGE LOSS



Webster Right et H Polots

Right
Left
Upper Right
Lower Right
Upper Left
Lower Left
Voice
Whisper
Lower Left
Upper Left
Voice

Right
Left
Upper Right
Lower Right
Upper Left
Lower Left
Voice
Whisper
Lower Left
Upper Left
Voice

F...L...; #721,387; Male; Age 43; White; Single.

DIAGNOSIS: Eighth nerve neuralgia (Meuniere's syndrome) - left.

For the past two years there has been a continuous buzzing in the left ear. About one year ago the patient noticed a slight hearing difficulty in that ear. These symptoms have become progressively worse. More recently he has noticed a sharp, short pain in the left side of the head which radiates to the cheek. Three weeks ago while walking he became dizzy and feared that he would fall but after sitting down awhile the attack diminished. Slight dizziness continued for three or four days and things seemed to whirl around. About a week later he again experienced extreme dizziness, this time with pain in the right side of the head, and when he tried to arise from a sitting position would have fallen had he not been assisted. Vomiting followed this attack. Four days ago another attack occurred.

PHYSICAL EXAMINATION: Examination normal, but patient complains of left sided headache.

NEUROLOGICAL EXAMINATION: Optic fundus could not be seen on the left, due to an opaque cornea resulting from an old injury. Caloric tests showed possible slight impairment of the left vestibular apparatus.

URINE: Amber; alkaline; no sugar nor albumen.

BLOOD: 11,900 W.B.C.; Kahn negative; pressure 104/68.

LUMBAR PUNCTURE: I.P. 140; dynamics normal; 4 cc. removed; F.P. 100; appearance normal; protein 23 mg/100 cc.

The eighth nerve was resected, following which the vertiginous condition improved. Post-operatively tenderness and pain developed in the upper right quadrant and on consultation it was believed that either liver or kidney pathology existed.

P...L...: 7521, 587; Hair: 45; White; Single.

DIAGNOSIS: Eighth nerve neuritis (Meningeal's syndrome) - left.

For the past two years there has been a continuous buzzing in the left ear. About one year ago the patient noticed a slight hearing difficulty in that ear. These symptoms have become progressively worse. More recently he has noticed a sharp, short pain in the left side of the head which radiates to the cheek. Three weeks ago while walking he became dizzy and feared that he would fall but after sitting down while the attack subsided. Right dizziness continued for three or four days and things seemed to whirl around. About a week later he again experienced extreme dizziness, this time with pain in the right side of the head, and when he tried to arise from a sitting position would have fallen had he not been assisted. Vomiting followed this attack. Four days ago another attack occurred.

PHYSICAL EXAMINATION: Examination normal, but patient complains of left

aided headache.

NEUROLOGICAL EXAMINATION: Optic fundus could not be seen on the left, due to an opaque cornea resulting from an old injury. Caloric tests showed possible slight impairment of the left vestibular apparatus.

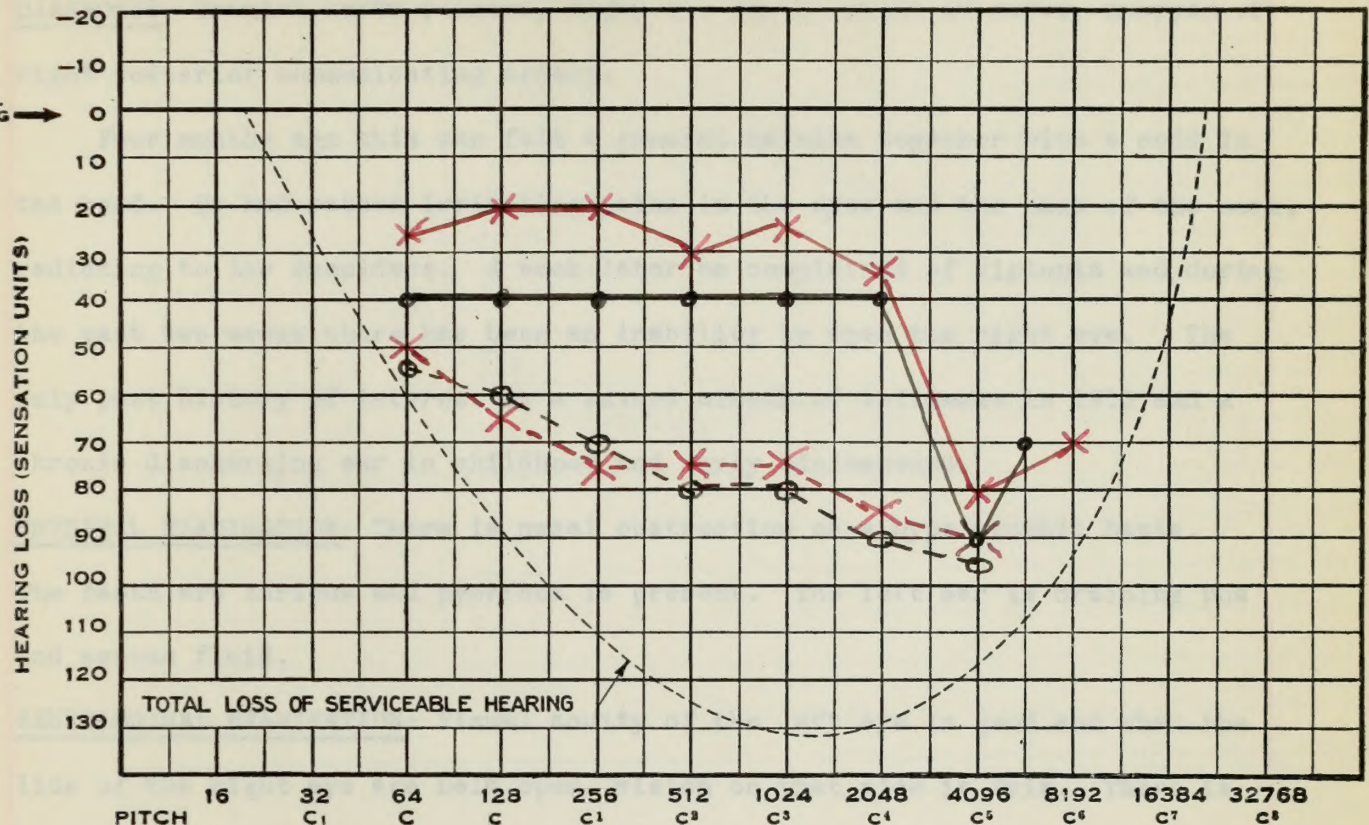
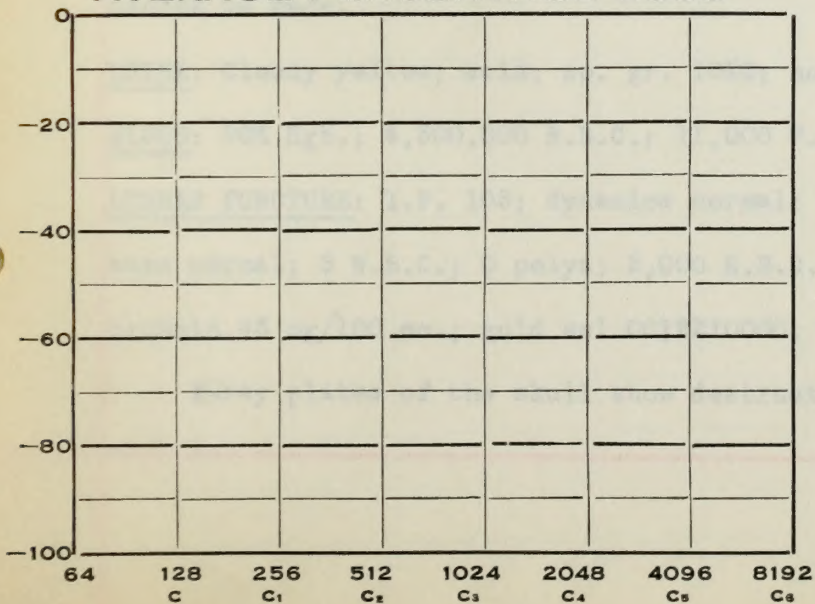
URINE: Amber; alkaline; no sugar nor albumen.

BLOOD: 11,200 R.B.C.; ESR negative; pressure 124/68.

LUMBAR PUNCTURE: I.P. 140; dynamics normal; 4 cc. removed; E.R. 100; appar-

ance normal; protein 23 at 100 cc.

The eighth nerve was resected, following which the vertiginous condition improved. Post-operatively tenderness and pain developed in the upper right quadrant and on consultation it was believed that either liver or kidney pathology existed.

EVANS MEMORIAL**AUDIOGRAM**NAME S. D. 702 577
DATE..... 19.....*Weber Right at 4 Points***AVERAGE PERCENTAGE LOSS**Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

RightLeftRinne ^{AC}
BC

Weber.....

Upper Limit.....

Lower Limit.....

Whisper.....

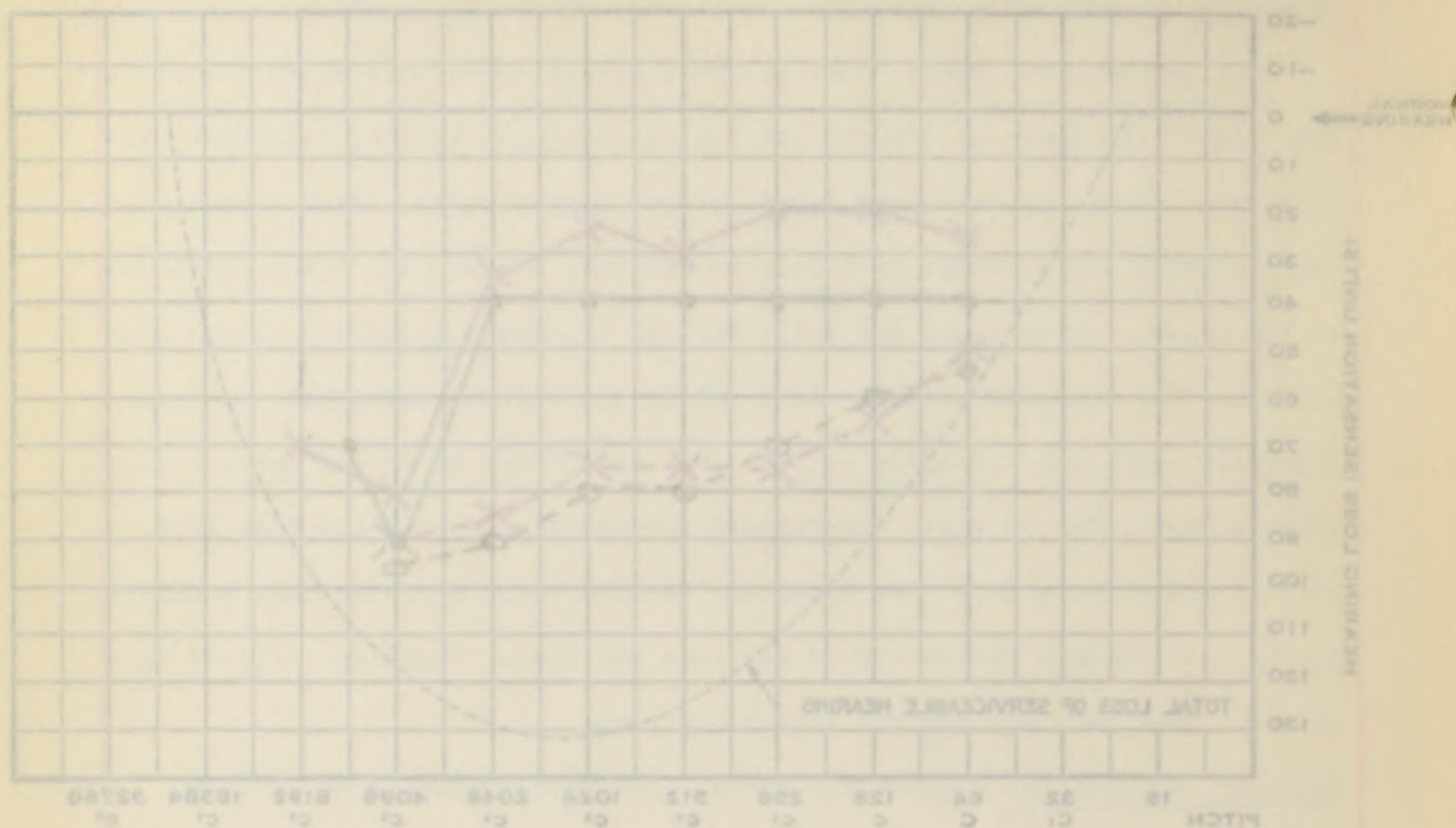
Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

J.D. 702 277



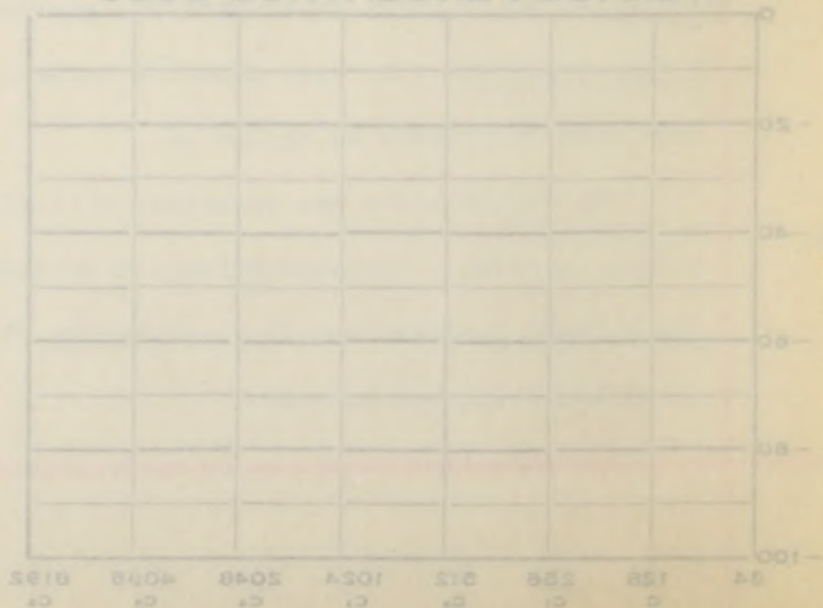
Frequency Hearing Loss

Right Ear

Left Ear

Weber Right at 4 Points

AVERAGE PERCENTAGE LOSS



Diagnosis

Dates

Chief Complaint

1. History

2. Exam

3. Diagnosis

4. Treatment

5. Prognosis

6. Discharge

Right

Left

Right

Left

Upper Limb

Lower Limb

Whisper

Voice

J... D...; #702,577; Male; Age 52; White; Married.

DIAGNOSIS: Cranial nerve palsies, right III nerve, right IV nerve; anurysm of right posterior communicating artery.

Four months ago this man felt a general malaise together with a cold in the head. He had rather irritating pains in the eyes and the back of the neck, radiating to the shoulders. A week later he complained of diplopia and during the past two weeks there has been an inability to open the right eye. The only past history of interest is a severe attack of influenza in 1918 and a chronic discharging ear in childhood and early adolescence.

PHYSICAL EXAMINATION: There is nasal obstruction on a hypertrophic basis.

The teeth are carious and pyorrhea is present. The left ear is draining pus and serous fluid.

NEUROLOGICAL EXAMINATION: Visual acuity of the left eye is good and when the lids of the right eye are held open, vision on that side is fair. There is complete paralysis of the 3rd. nerve on the right, together with partial involvement of the 4th. and 6th. There is no exophthalmus and the discs appear normal. The blind spot of the right eye is displaced upward and slightly outward. Both abdominal reflexes are diminished and the right cremasteric is absent. Lateral movement of the right eye is possible but internal movements cannot be made.

URINE: Cloudy yellow; acid; sp. gr. 1020; no sugar nor albumen.

BLOOD: 90% Hgb.; 4,300,000 R.B.C.; 11,000 W.B.C.; Kahn negative.

LUMBAR PUNCTURE: I.P. 105; dynamics normal; 12 cc. removed; F.P. 30; appearance normal; 8 W.B.C.; 0 polys; 2,000 R.B.C.; no Ross-Jones nor Pandy; protein 43 mg/100 cc.; gold sol 0012210000; Wasserman negative.

X-ray plates of the skull show destruction of the dorsum sellae.

2... D...; 4002, 377; 1015; Age 22; White; Married.

DIAGNOSIS: Cranial nerve palsies, right III nerve, right IV nerve; aneurysm of right posterior communicating artery.

Four months ago this man felt a general malaise together with a cold in the head. He had rather irritating pains in the eyes and the back of the neck radiating to the shoulders. A week later he complained of diplopia and during the past two weeks there has been an inability to open the right eye. The only past history of interest is a severe attack of influenza in 1918 and a chronic discharging ear in childhood and early adolescence.

PHYSICAL EXAMINATION: There is nasal obstruction on a hypertrophic basis. The teeth are carious and pyorrhea is present. The left ear is draining pus and serous fluid.

NEUROLOGICAL EXAMINATION: Visual acuity of the left eye is good and when the axis of the right eye are held open, vision on that side is fair. There is complete paralysis of the 3rd. nerve on the right, together with partial involvement of the 4th. and 6th. There is no exophthalmos and the discs appear normal. The blind spot of the right eye is displaced upward and slightly outward. Both abdominal reflexes are diminished and the right cremasteric is absent. Lateral movement of the right eye is possible but lateral movements cannot be made.

URINE: Cloudy yellow; acid; sp. gr. 1020; no sugar nor albumen.

BLOOD: 504 Rbc.; 4,200,000 W.B.C.; 11,000 W.B.C.; Kahn negative.

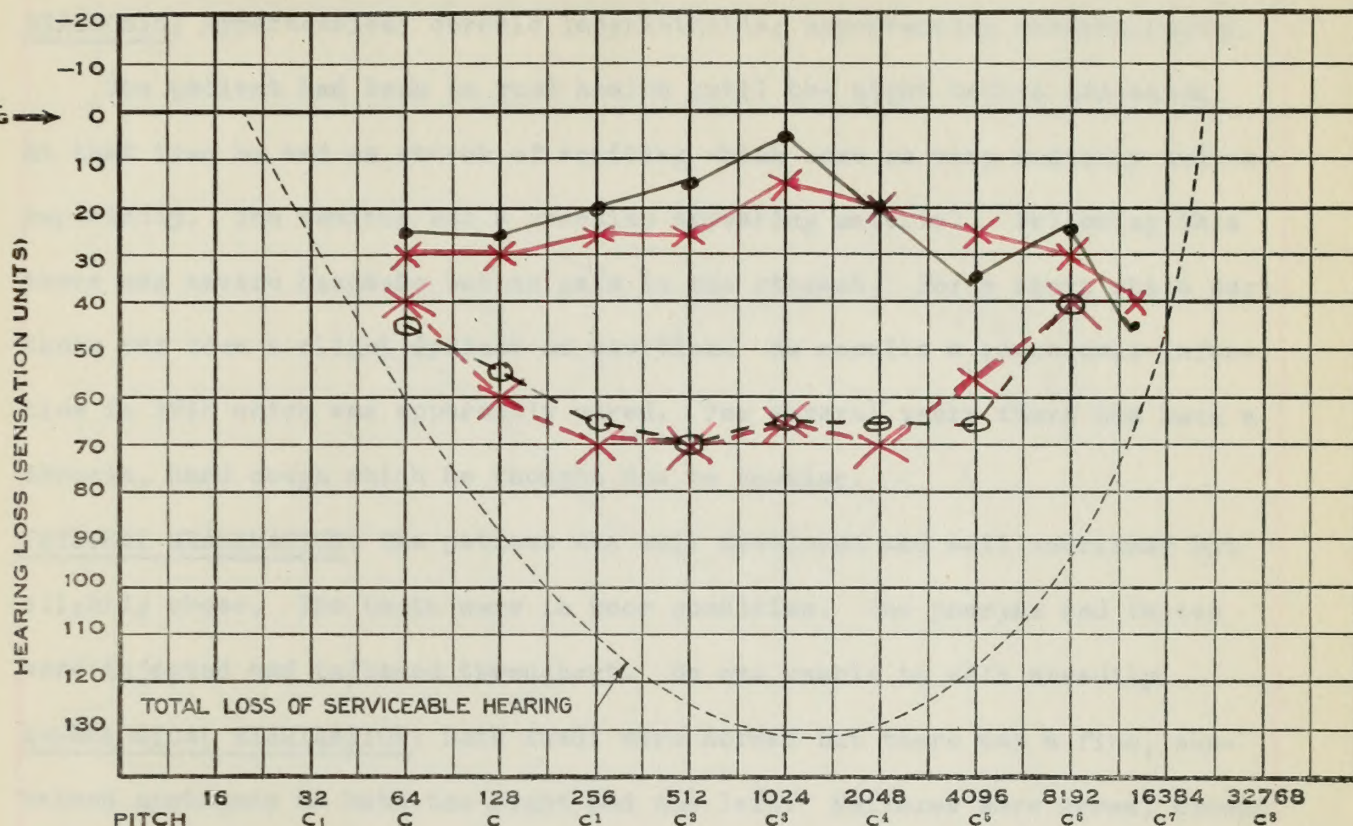
CHOLESTEROL: 1.4; 102; dyslipidemia normal; 12 cc. removed; 5.5; 50; appearance normal; 8 W.B.C.; 0 polys; 2,000 R.B.C.; no Ross-Jones nor Fehling;

protein 43 mg/100 cc.; gold not precipitated; Wassermann negative.

X-ray plates of the skull show destruction of the dorsum sellae.

EVANS MEMORIAL

AUDIOGRAM

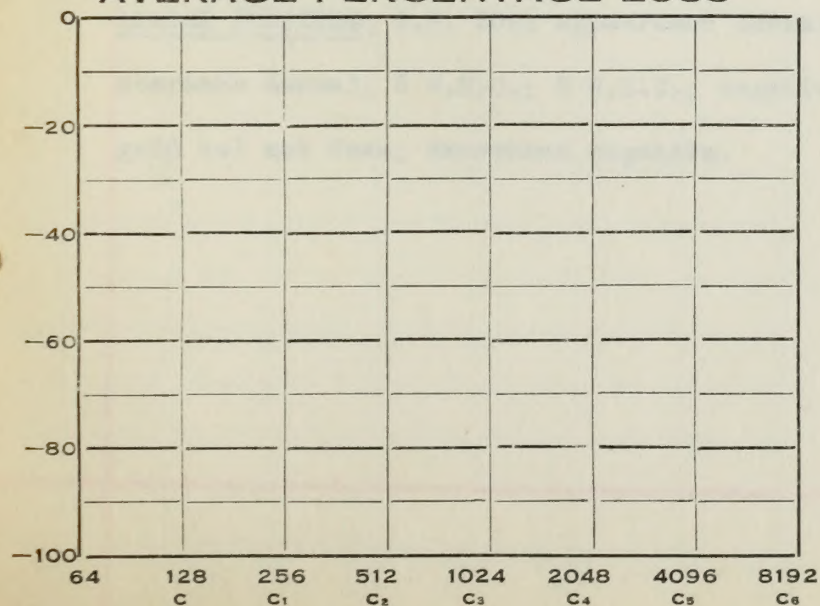
NAME M.S. 728810
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

*Weber = at 4 Points
(unreliable)*

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right Left

Rinne ^{AC} _{BC}

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

M... S...; #728,810; Male; Age 40; White; Married.

DIAGNOSIS: Hypertension; chronic labyrinthitis; hypertensive encephalopathy.

The patient had been in good health until the night before admission. At that time he had an attack of vomiting which came on very suddenly and unexpectedly. The vomitus was a greenish appearing material. Following this there was severe headache but no pain in the stomach. For a short while past there has been a slight dyspnea on exertion. He recalls a gonococcus infection in 1916 which was apparently cured. For several years there has been a chronic, hard cough which he thought due to smoking.

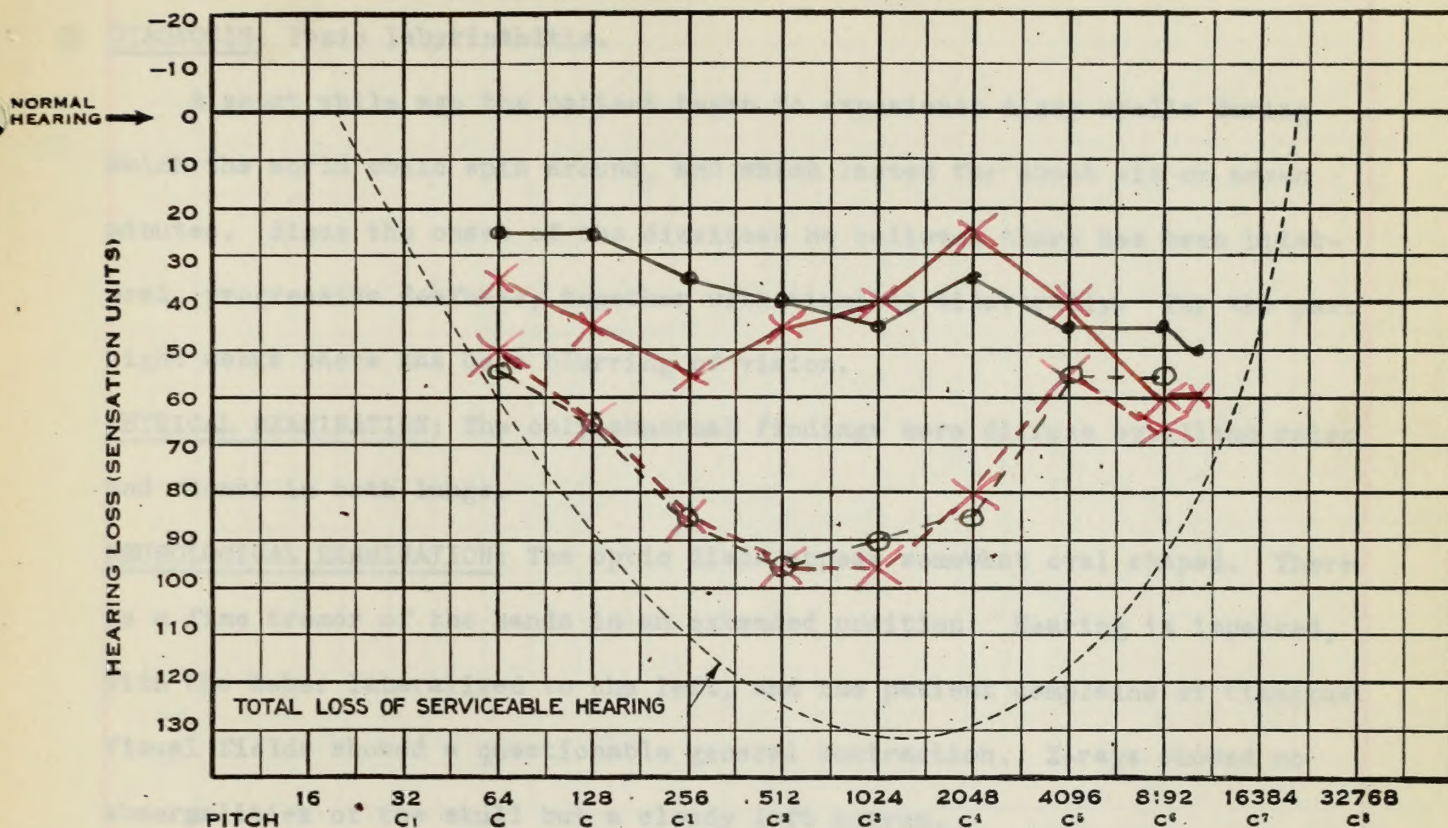
PHYSICAL EXAMINATION: The patient was well developed and well nourished but slightly obese. The teeth were in poor condition. The pharynx and fauces were injected and inflamed throughout. He was unable to walk steadily.

NEUROLOGICAL EXAMINATION: Both fundi were normal but there was a fine, sustained nystagmus to both the right and the left. Reflexes were normal except the abdominals which were absent. The gait was staggering but the Romberg negative.

URINE: Yellow, cloudy; acid; sp. gr. 1020; no sugar nor albumen.

BLOOD: 102% Hgb.; 5,230,000 R.B.C.; 10,200 W.B.C.; N.P.N. 35; pressure 210/120 Kahn negative.

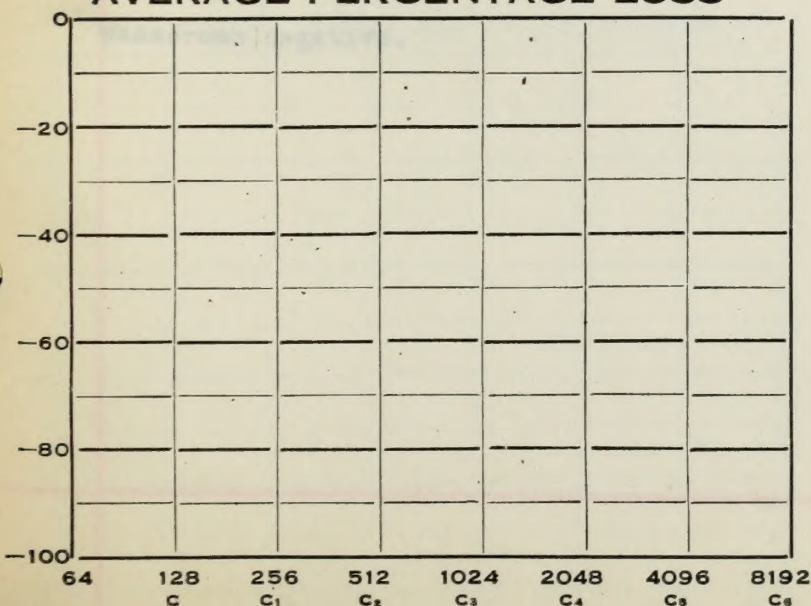
LUMBAR PUNCTURE: I.P. 200; appearance normal; 10 cc. removed; F.P. 100; appearance normal; 6 W.B.C.; 5 R.B.C.; negative Ross-Jones; positive Pandy; gold sol not done; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**NAME M.E. 727679
DATE _____ 19__

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSSWeber Left at { Vertex
Forehead
Right at { Nose bridge
Chin

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

M... E...; #727,679; Male; Age 36; White; Married.

DIAGNOSIS: Toxic labyrinthitis.

A short while ago the patient began to experience dizzy spells during which the world would spin around, and which lasted for about six or seven minutes. Since the onset of the dizziness he believes there has been bilateral, progressive deafness, together with tinnitus bilaterally. For the past eight weeks there has been blurring of vision.

PHYSICAL EXAMINATION: The only abnormal findings were diffuse sybillant rales and rhonci in both lungs.

NEUROLOGICAL EXAMINATION: The optic discs appear somewhat oval shaped. There is a fine tremor of the hands in an extended position. Hearing is impaired, with the Weber lateralized to the left, and the patient complains of tinnitus. Visual fields showed a questionable general contraction. X-rays showed no abnormalities of the skull but a cloudy left antrum.

URINE: Straw; acid; sp. gr. 1014; no sugar nor albumen.

BLOOD: 95% Hgb.(S); 4,820,000 R.B.C.; 11,700 W.B.C.; N.P.N. 28; B.S. 98; Kahn negative; pressure 95/80.

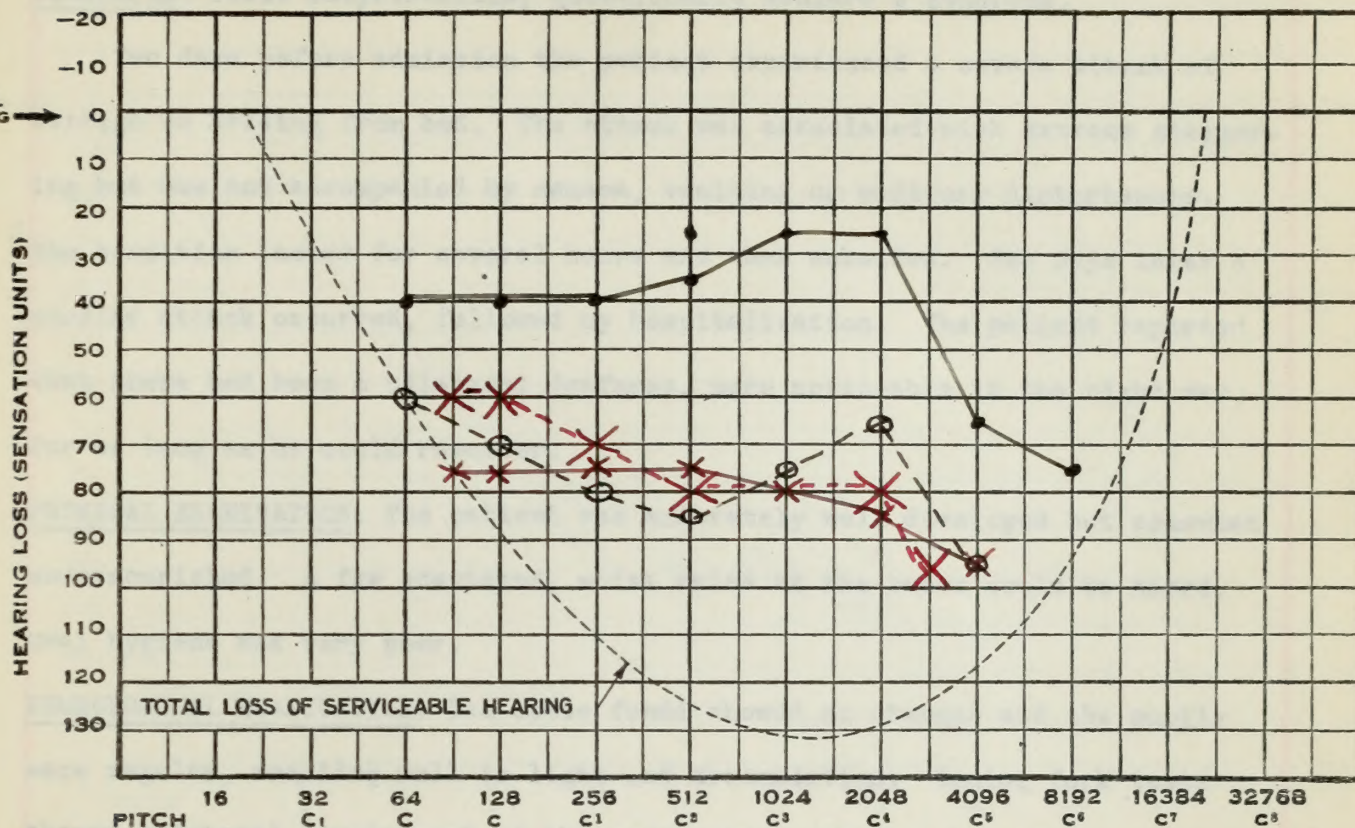
LUMBAR PUNCTURE: I.P. 160; dynamics normal; 15 cc. removed; F.P. 110; appearance normal; 1 W.B.C.; 1 R.B.C.; protein 25 mg/100 cc.; gold sol 0000000000; Wasserman negative.

EVANS MEMORIAL

AUDIOGRAM

NAME B.P. 743332

DATE..... 19.....

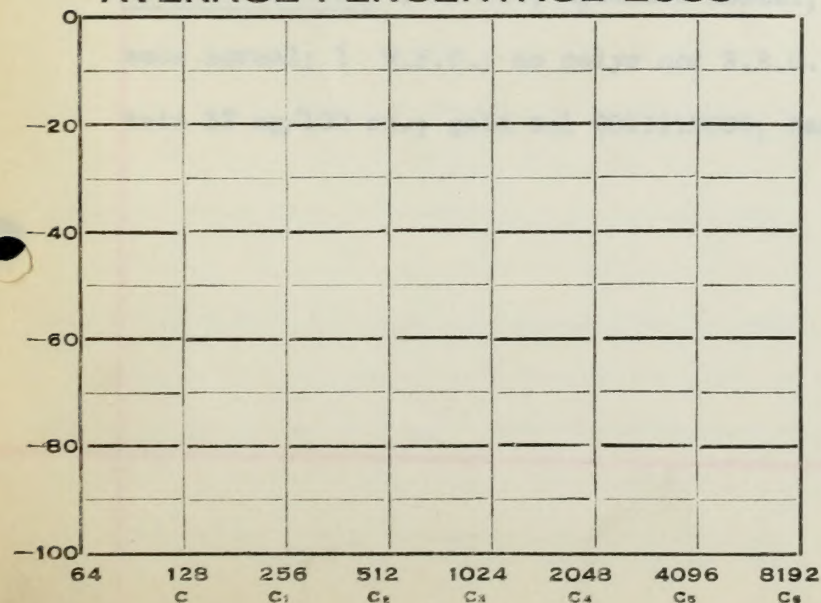


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber = at 4 Points
(Questionable).

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

Right

Left

Rinne AC
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

B... P...; #743,332; Male; Age 48; White; Married.

DIAGNOSIS: Toxic labyrinthitis; questionable Meniere's syndrome.

Two days before admission the patient experienced a severe attack of vertigo on arising from bed. The attack was associated with extreme staggering but was not accompanied by nausea, vomiting or auditory disturbances. The condition lasted for several hours and then subsided. Two days later a similar attack occurred, followed by hospitalization. The patient reported that there had been a bilateral deafness, more noticeable in the right ear, for as long as he could remember.

PHYSICAL EXAMINATION: The patient was moderately well developed but somewhat undernourished. A few scattered, moist rales at the bases could be heard. Oral hygiene was very poor.

NEUROLOGICAL EXAMINATION: The optic fundi showed no changes and the pupils were regular, reacting well to light and accommodation. Tuning fork tests showed bilateral involvement of the ears, more marked on the right. The reflexes were generally hyperactive but equal.

URINE: Amber; acid; sp. gr. 1018; no sugar nor albumen.

BLOOD: 92% Hgb.; 4,900,000 R.B.C.; 6,000 W.B.C.; Kahn negative; N.P.N. 35; B.S. 80; pressure 100/70.

LUMBAR PUNCTURE: I.P. 110; dynamics normal; 15 cc. removed; F.P. 40; appearance normal; 1 W.B.C.; no polys nor R.B.C.; no Ross-Jones nor Pandy; protein 32 mg/100 cc.; gold sol 0011110000; Wasserman negative.

... P...; eyes, 5.5; nose, 4.5; ears, 4.5; weight, 10.5.

DIAGNOSIS: Toxic labyrinthitis; questionable hearing's syndrome.

Two days before admission the patient experienced a severe attack of vertigo on arising from bed. The attack was associated with extreme staggering but was not accompanied by nausea, vomiting or auditory disturbances. The condition lasted for several hours and then subsided. Two days later a similar attack occurred, followed by hospitalization. The patient reported that there had been a bilateral deafness, more noticeable in the right ear, for as long as he could remember.

PHYSICAL EXAMINATION: The patient was moderately well developed but somewhat undernourished. A few scattered, moist rales in the bases could be heard.

oral hygiene was very poor.

NEUROLOGICAL EXAMINATION: The optic fundi showed no changes and the pupils were regular, reacting well to light and accommodation. Tuning fork tests showed bilateral involvement of the ears, more marked on the right. The reflexes were generally hyporeactive but equal.

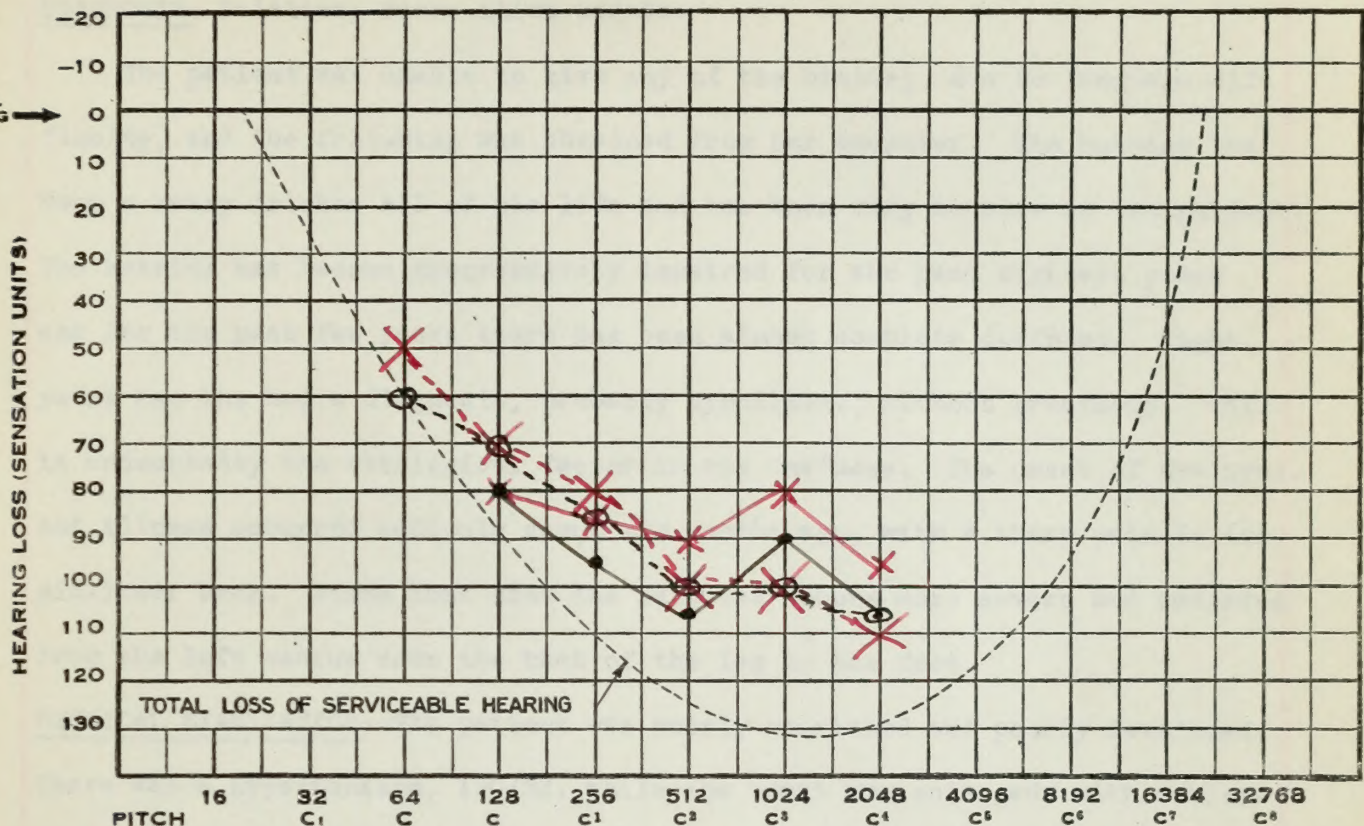
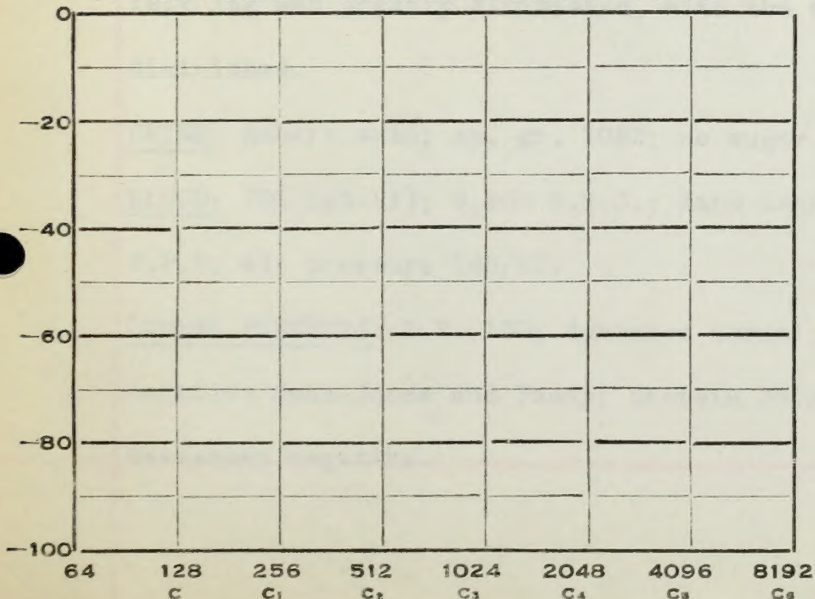
URINE: Amber; acid; sp. gr. 1.015; no sugar nor albumen.

BLOOD: Hb. 12; Hct. 35; WBC 8,500; RBC 4,500; ESR 10; uric acid 4.5 mg.

B.S. 80; creatinine 1.0 mg.

NEURAL FUNCTION: I.P. 110; dynamometer normal; IS co. removed; S.P. 40; appearance normal; I.S.B.C.; no reflex nor R.B.C.; no Ross-Jones nor Pandy; pro-

tein 32 mg/100 cc.; gold and colloidal reactions negative.

EVANS MEMORIAL**AUDIOGRAM**NAME D.D. 692887
DATE..... 19.....**AVERAGE PERCENTAGE LOSS***Weber = at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

..... Rinne AC

..... BC

..... Weber

..... Upper Limit.....

..... Lower Limit.....

..... Whisper.....

..... Voice.....

EVANS MEMORIAL

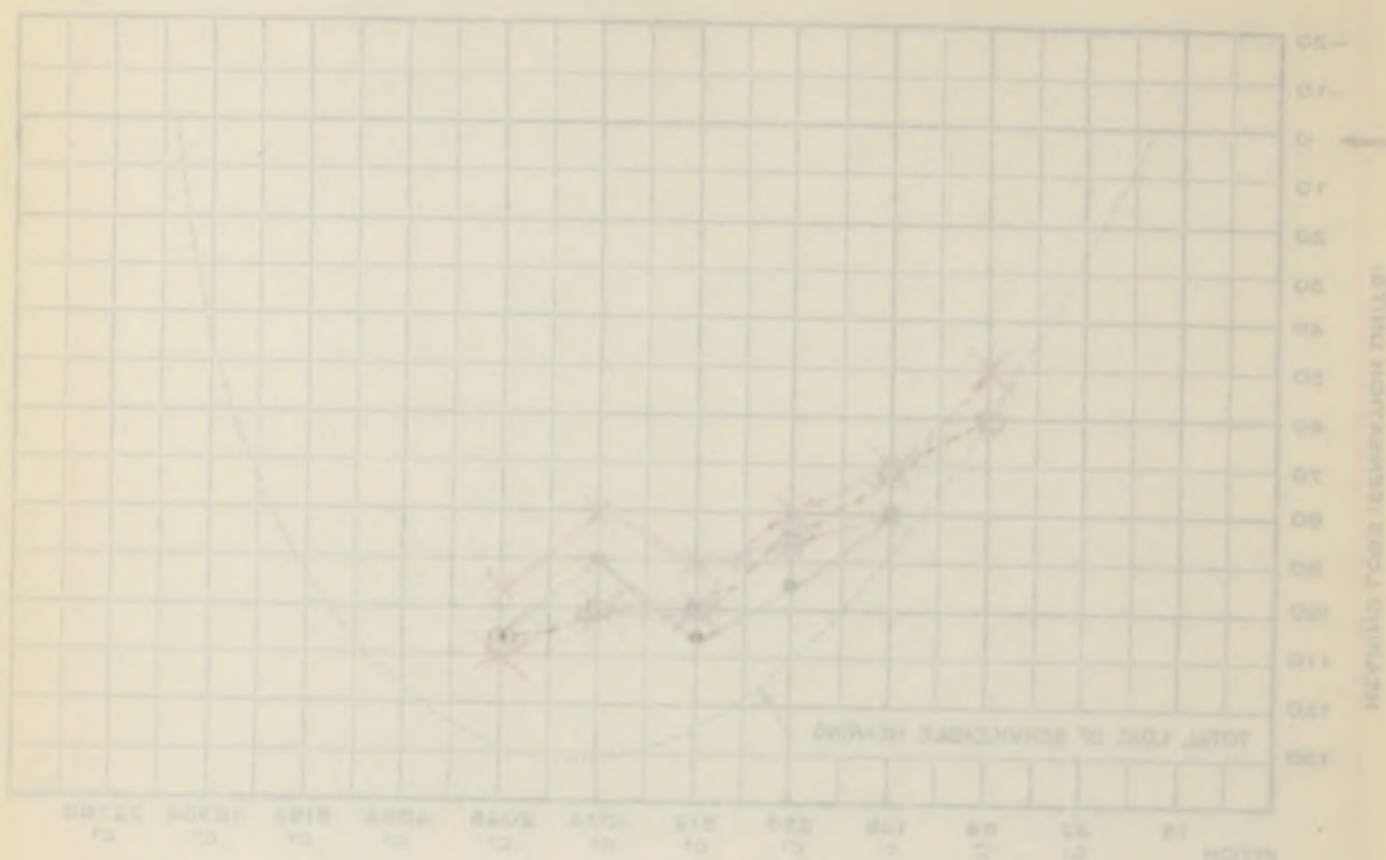
692887

D.D.

NAME

AUDIOGRAM

DATE



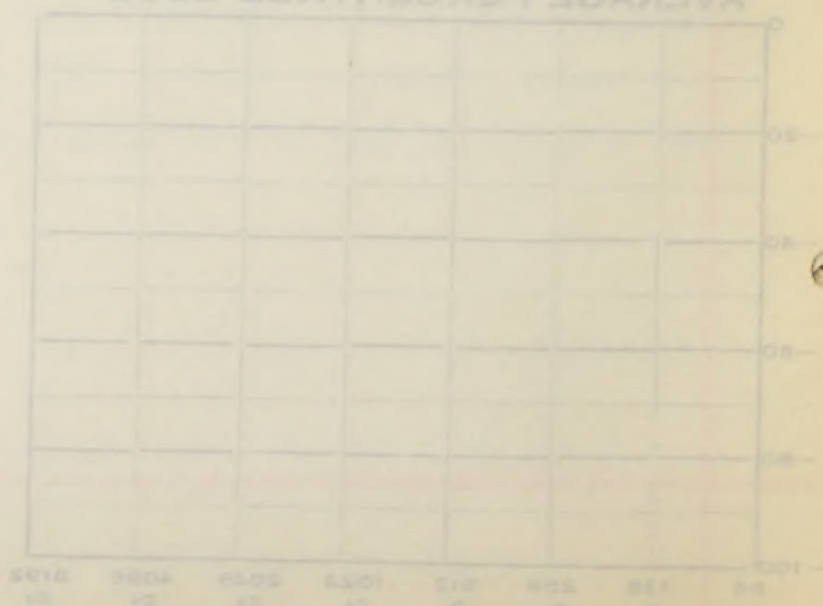
Frequency Hearing Test

Right Ear

Left Ear

Weber - at 4 points

AVERAGE PERCENTAGE LOSS



Exam
Date
Time
Place
1. Duration
2. Time
3. Distance
4. Temperature
5. Humidity
6. Wind

Notes

Exam
Date
Time
Place
1. Duration
2. Time
3. Distance
4. Temperature
5. Humidity
6. Wind

D... D... A...; #692,887; Age 52; Female; White; Married.

DIAGNOSIS: Sciatica; Sacro-iliac strain.

The patient was unable to give any of the history, due to language difficulty, and the following was obtained from her daughter. The husband has been a heavy drinker all of his life and has been very abusive to the patient. The hearing has become progressively impaired for the past eighteen years and for the past few years there has been almost complete deafness. Eight years ago she had a diagnosis, probably syphilitic, without treatment. This is undoubtedly the etiological factor in the deafness. The onset of the present illness occurred suddenly about six months ago, with a sharp pain in the mid-lower back. Since that time the pain has become more severe and radiates from the left sacrum down the back of the leg to the foot.

PHYSICAL EXAMINATION: The patient was poorly nourished and poorly developed. There was a hypertension, 190/82, while the heart was enlarged, with a blowing systolic murmur, heard best at the base. There were marked varicosities of both lower extremities and slight atrophy of the left leg from the buttock down.

NEUROLOGICAL EXAMINATION: There was vascular tortuosity in both retinae. The hearing was greatly diminished bilaterally. The tone of all groups in the left leg was greatly diminished, with the ankle jerk absent and the knee jerk diminished.

URINE: Amber; acid; sp. gr. 1022; nonsugar none albumen.

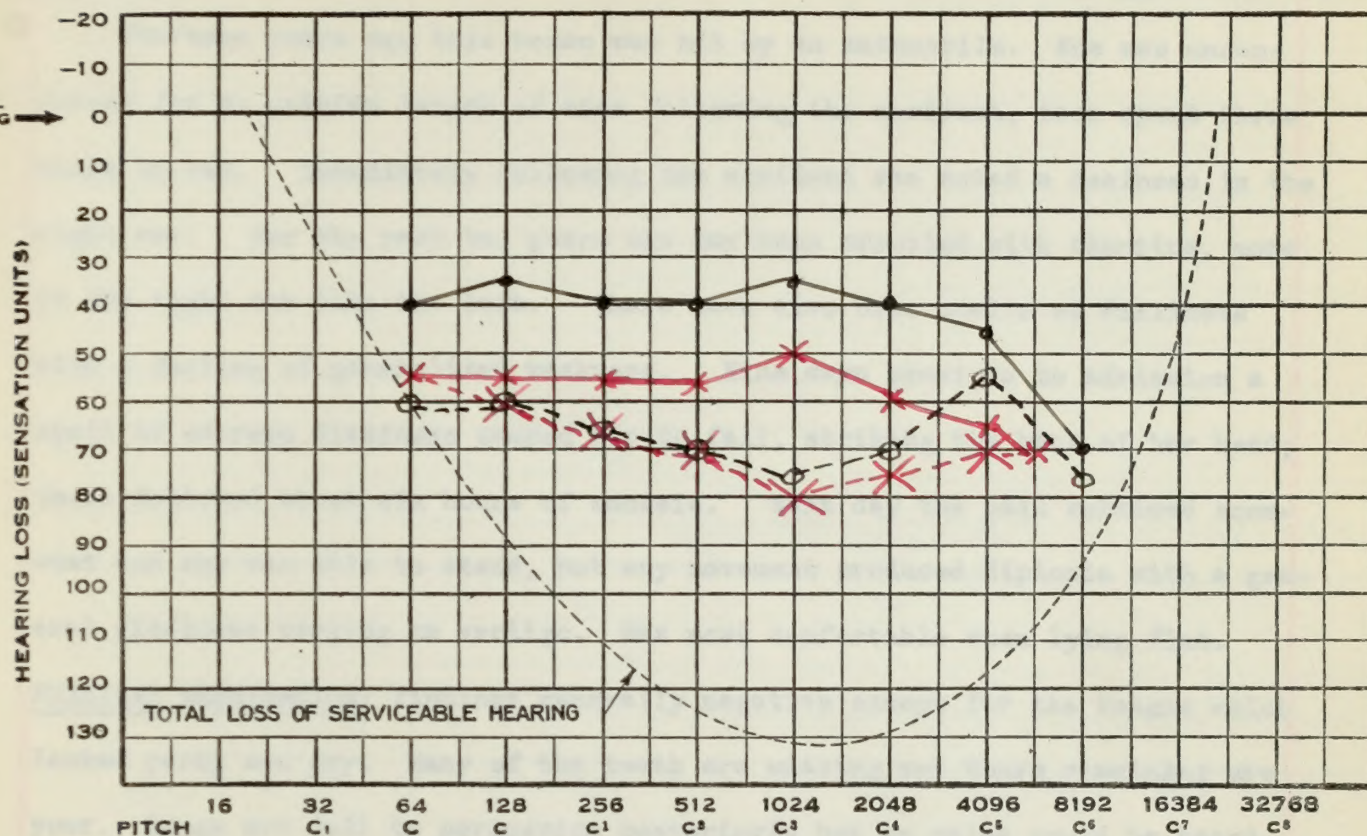
BLOOD: 70% Hgb.(T); 9,900 W.B.C.; Kahn negative; B.S. 130 (not fasting); N.P.N. 41; pressure 190/82.

LUMBAR PUNCTURE: I.P. 130; dynamics normal; 8 cc. removed; F.P. 120; no cells; negative Ross-Jones and Pandy; protein 30 mg/100 cc.; gold sol 0011100000; Wasserman negative.

01/10/2009 08:00:00

EVANS MEMORIAL

AUDIOGRAM

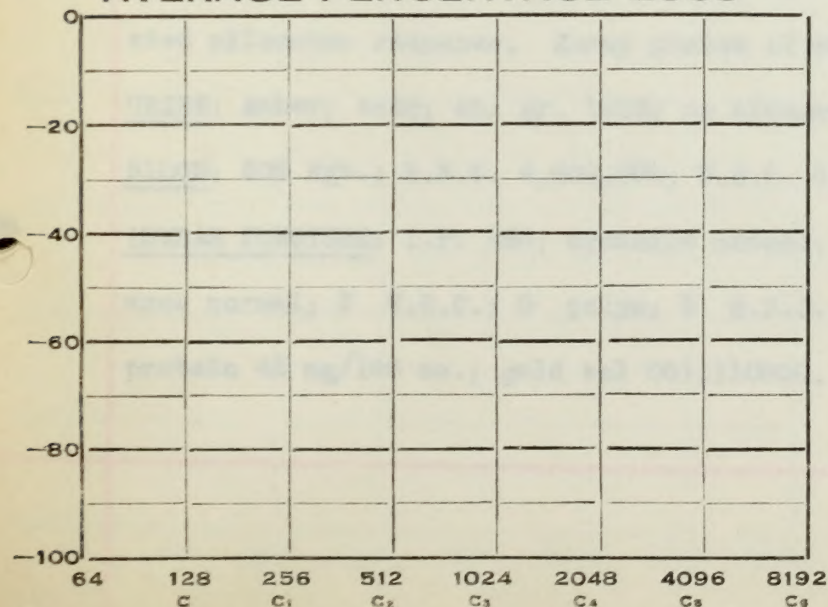
NAME C. M. 737 740
DATE _____ 19__

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

*Weber Left at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit

Lower Limit

Whisper

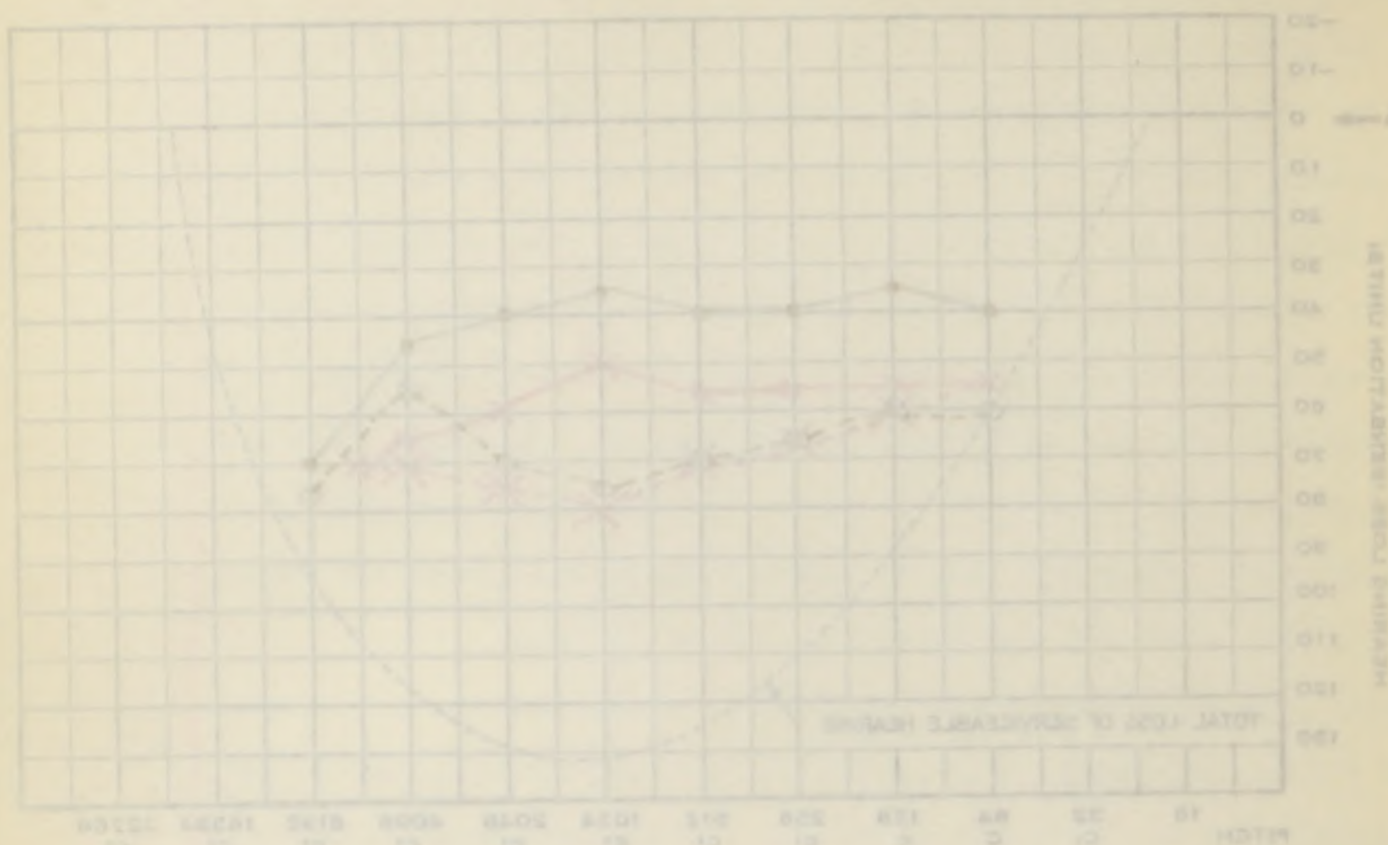
Voice

EVANS MEMORIAL

AUDIOGRAM

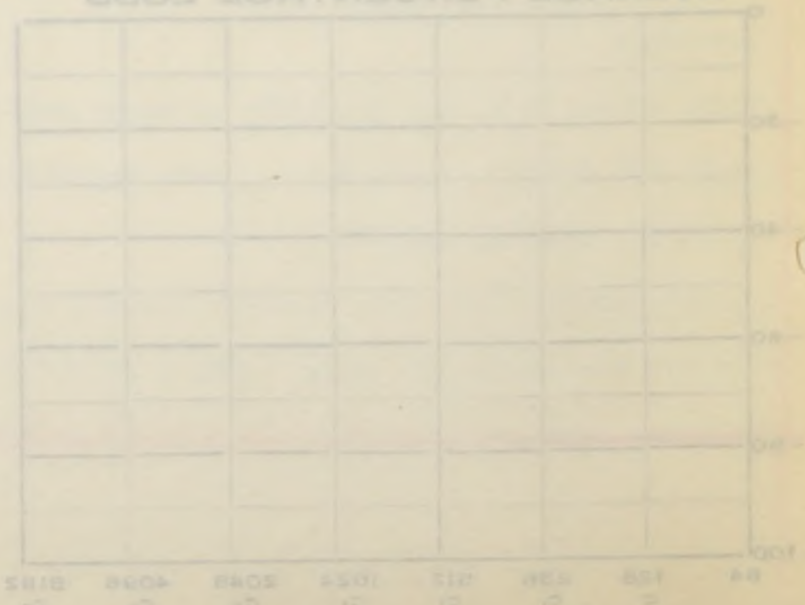
NAME C.M.
DATE

737746



Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Right
Left

Upper Third
Lower Third
Voice

Weber Test at 4 Points

C...M...; #737,740; Female; Age 38; White; Married.

DIAGNOSIS: Chronic bilateral middle ear deafness of unknown etiology.

Fourteen years ago this woman was hit by an automobile. She was unconscious for an unknown length of time following the accident, then spent three weeks in bed. Immediately following the accident she noted a deafness in the right ear. For the past two years she has been troubled with tinnitus, more in the right ear than the left. There have also been spells of dizziness with a feeling of generalized weakness. Nine days previous to admission a spell of extreme dizziness caused her to fall, striking the back of her head; there followed about six hours of amnesia. Next day the pain subsided somewhat and she was able to stand, but any movement produced diplopia with a general giddiness verging on vertigo. Was most comfortable when lying flat.

PHYSICAL EXAMINATION: Findings generally negative except for the tongue which looked pasty and dry. Many of the teeth are missing and those remaining are poor. Lungs are dull to percussion posteriorly but no rales could be heard.

NEUROLOGICAL EXAMINATION: The patient is fairly alert but somewhat overanxious. Spine is normal. The cranium is normal except for tenderness over the occipital region due to the fall. The eighth nerve is apparently the only one involved. Reflexes are normal with equivocal bilateral Babinski, Oppenheim, Chaddock and Gordon-Holmes. Pupils are dilated and there is an exaggerated pilomotor response. X-ray plates of skull show no fracture.

URINE: Amber; acid; sp. gr. 1018; no albumen nor sugar.

BLOOD: 80% Hgb.; R.B.C. 4,400,000; W.B.C. 6,600; pressure 120/70.

LUMBAR PUNCTURE: I.P. 150; dynamics normal; 15 cc. removed; F.P. 85; appearance normal; 2 W.B.C.; 0 polys; 2 R.B.C.; negative Ross-Jones and Pandy; protein 45 mg/100 cc.; gold sol 0011110000.

C...M...; 7577,740; Female; Age 38; White; Married.

DIAGNOSIS: Chronic bilateral middle ear deafness of unknown etiology.

Fourteen years ago this woman was hit by an automobile. She was unconscious for an unknown length of time following the accident, then spent three weeks in bed. Immediately following the accident she noted a deafness in the right ear. For the past two years she has been troubled with tinnitus, more in the right ear than the left. There have also been spells of deafness with a feeling of generalized weakness. Nine days previous to admission a spell of extreme dizziness caused her to fall, striking the back of her head; there followed about six hours of amnesia. Next day the pain subsided somewhat and she was able to stand, but any movement produced diplopia with a generalized dizziness verging on vertigo. Was most comfortable when lying flat.

PHYSICAL EXAMINATION: Findings generally negative except for the tongue which looked pasty and dry. Many of the teeth are missing and those remaining are poor. Lungs are dull to percussion posteriorly but no rales could be heard.

NEUROLOGICAL EXAMINATION: The patient is fairly alert but somewhat overanxious. Spine is normal. The cranial nerves are normal except for tenderness over the occipital region due to the fall. The eighth nerve is apparently the only

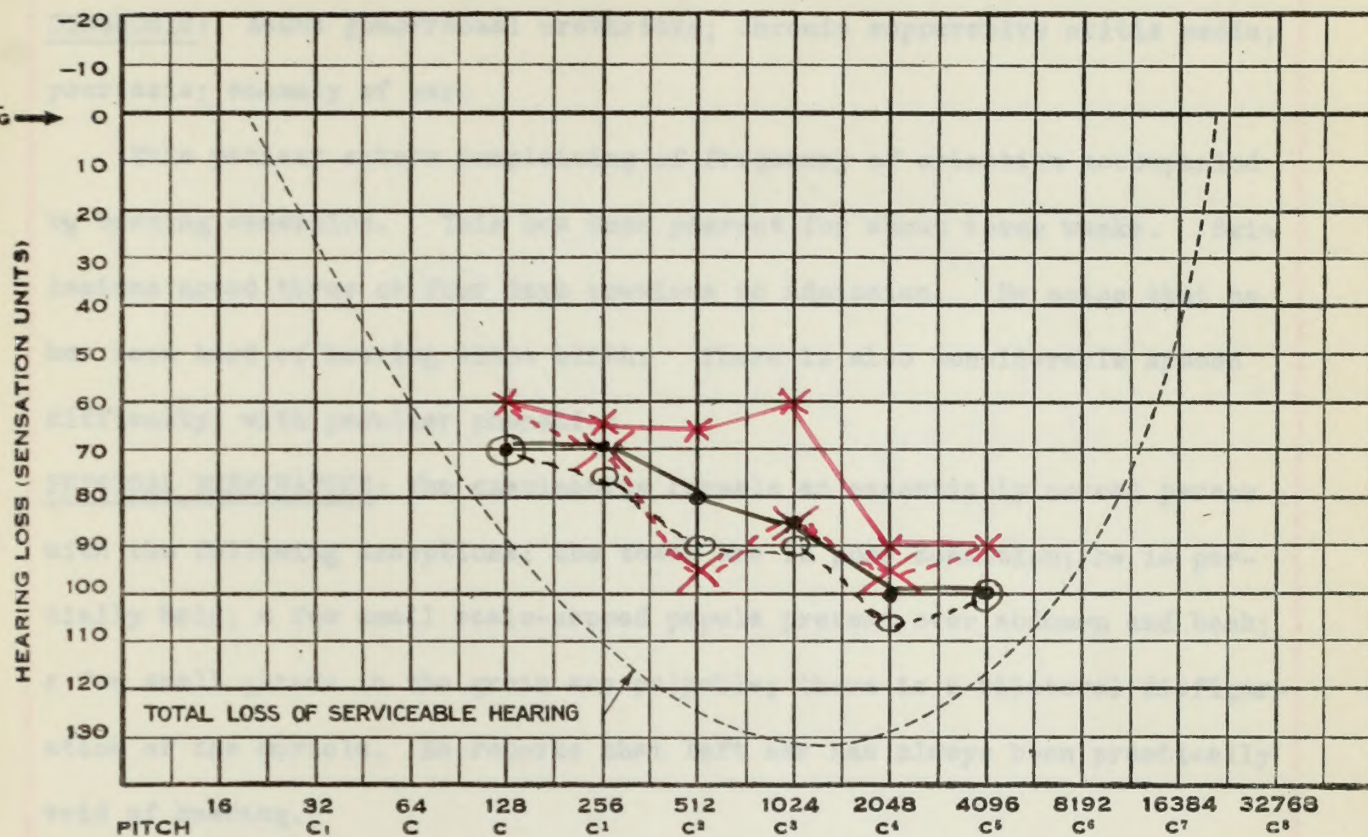
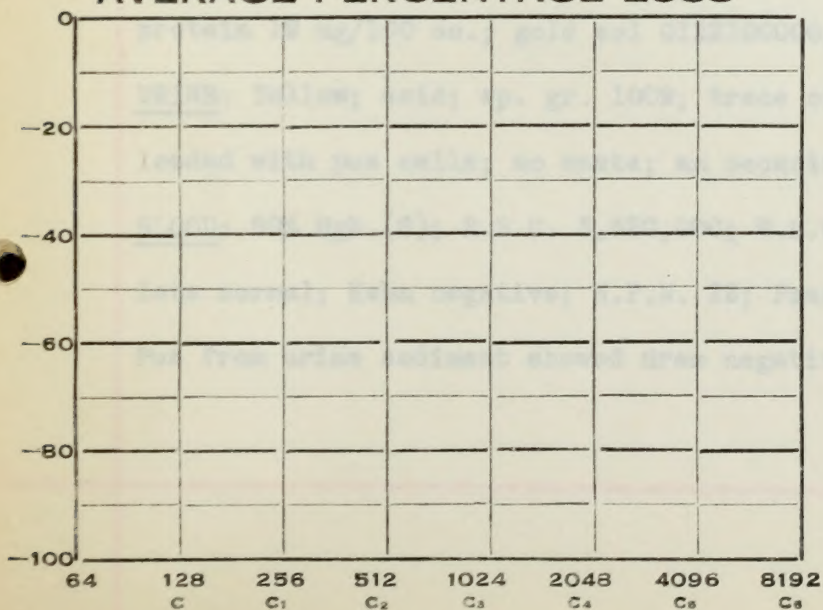
one involved. Reflexes are normal with epivocal bilateral Babinski. Oppenheim, Chaddock and Gordon-Holmes. Pupils are dilated and there is an exaggerated pilomotor response. X-ray plates of skull show no fracture.

URINE: Amber; acid; sp. gr. 1.018; no albumen nor sugar.

BLOOD: 806 Hgb.; R.E.C. 4,400,000; W.B.C. 6,600; pressure 120/70.

LUMBAR PUNCTURE: I.P. 180; dynamics normal; 15 cc. removed; S.P. 85; appearance normal; 2 W.B.C.; 0 polys; 2 R.E.C.; negative Rosen-Jones and Pandey;

protein 45 mg/100 cc.; gold sol 001110000.

EVANS MEMORIAL**AUDIOGRAM**NAME K. H. 740814
DATE..... 19.....**AVERAGE PERCENTAGE LOSS***Weber Left at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit.....

Lower Limit.....

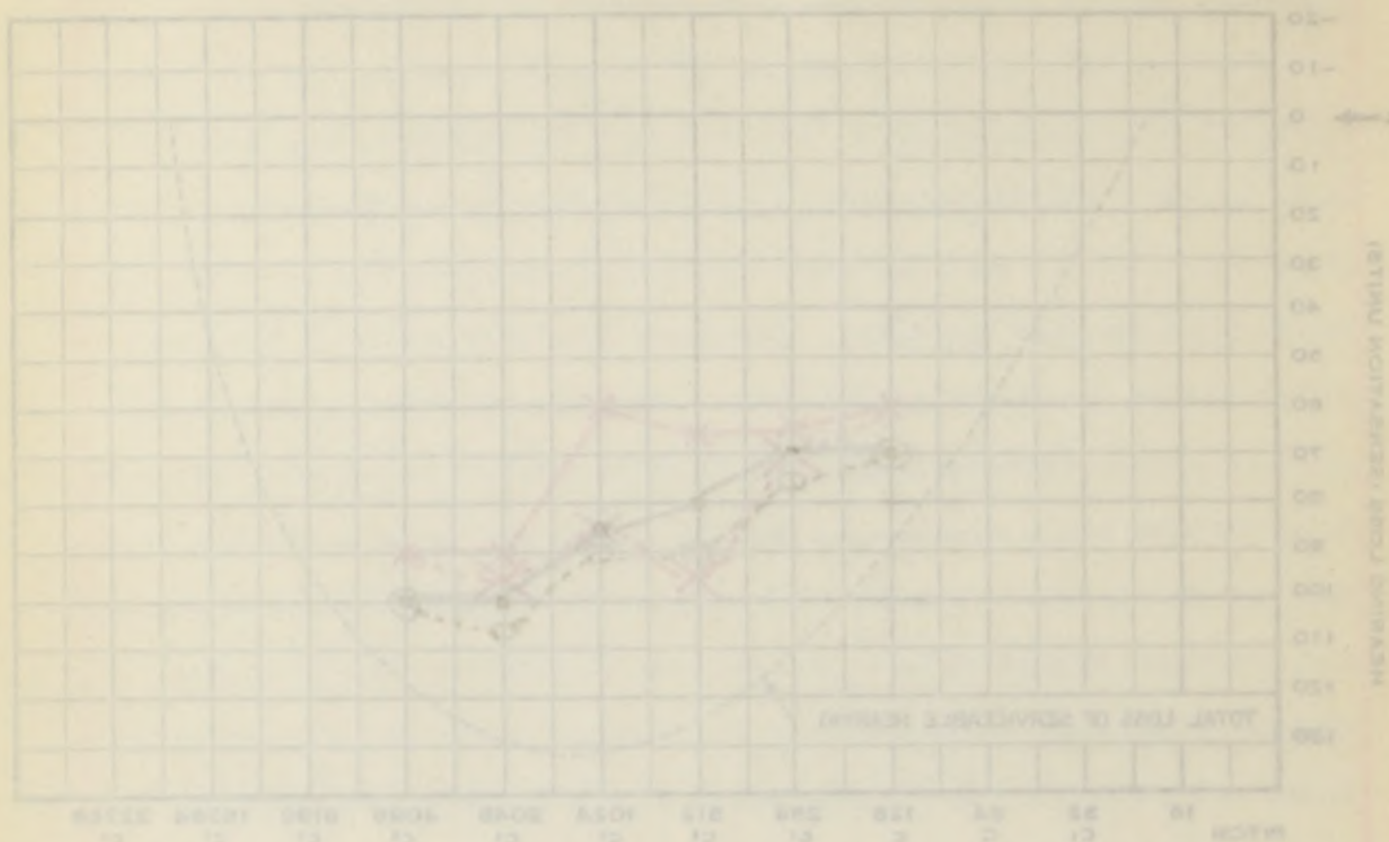
Whisper.....

Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME K. H. 740114
DATE 10



K... H... , #740,814, Male, Age 30, Single, White.

DIAGNOSIS: Acute gonorrhoeal urethritis; chronic suppurative otitis media; psoriasis; anomaly of ear.

This patient enters complaining of frequency of urination accompanied by burning sensation. This has been present for about three weeks. Skin lesions noted three or four days previous to admission. He notes that he has been hard of hearing since birth. There is also considerable speech difficulty, with peculiar phonation.

PHYSICAL EXAMINATION: The examination reveals an essentially normal person with the following exceptions: the teeth are in poor condition; he is partially bald; a few small scale-capped papula present over abdomen and back; a few small glands in the groin are palpable; there is a bilateral disfiguration of the auricle. He reports that left ear has always been practically void of hearing.

The history shows the urinary symptoms noted above, probably of a gonococcus etiology. He denies chancre. Family history and past history is negative.

LUMBAR PUNCTURE: I.P. 95; dynamics nprmal; 8 cc. removed; F.P. 45; appearance normal; 2 W.B.C.; 0 polys; 0 R.B.C.; negative Ross-Jones and Pandy; protein 19 mg/100 cc.; gold sol 0122100000; Wasserman negative.

URINE: Yellow; acid; sp. gr. 1009; trace of albumen but no sugar; sediment loaded with pus cells; no casts; an occasional R.B.C.

BLOOD: 80% Hgb.(S); R.B.C. 3,520,000; W.B.C. 11,900; R.B.C. normal, platelets normal; Kahn negative; N.P.N. 23; Pressure 100/60.

Pus from urine sediment showed Gram negative diplococci.

M... H... , 4740, 314, Male, Age 30, Single, White.

DIAGNOSIS: Acute gonorrheal urethritis; chronic suppurative otitis media;

proctitis; anomaly of ear.

This patient enters complaining of frequency of urination accompanied by burning sensation. This has been present for about three weeks. Skin lesions noted three or four days previous to admission. He notes that he has been hard of hearing since birth. There is also considerable speech difficulty, with peculiar phonation.

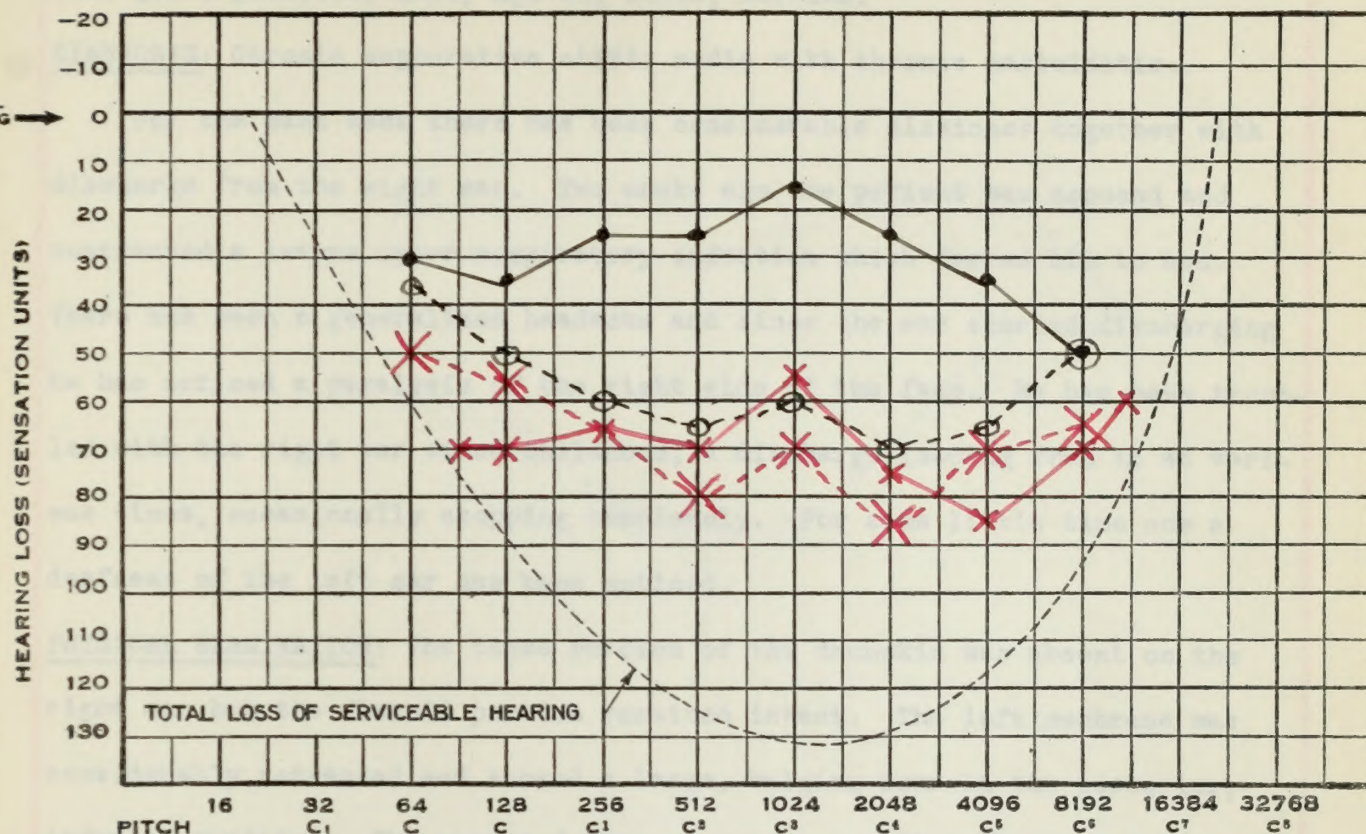
PHYSICAL EXAMINATION: The examination reveals an essentially normal person with the following exceptions: the teeth are in poor condition; he is partially bald; a few small scaly-capped papules present over abdomen and back; a few small glands in the groin are palpable; there is a bilateral distention of the auricles. He reports that left ear has always been practically void of hearing.

The history shows the urinary system noted above, probably of a gonococcus etiology. He denies chancres. Family history and past history is negative.

LUMBAR FUNCTION: I.P. 92; hysteresis normal; 5 cc. removed; F.P. 45; appearance normal; S.W.R.C.; 0 Golyar; 0 R.R.C.; negative Rosen-Jones and Tandy; protein 12 mg/100 cc.; gold not DISSEMINATED; Wasserman negative.

URINE: Yellow; acid; sp. gr. 1.009; trace of albumen but no sugar; sediment loaded with pus cells; no casts; an occasional R.B.C.

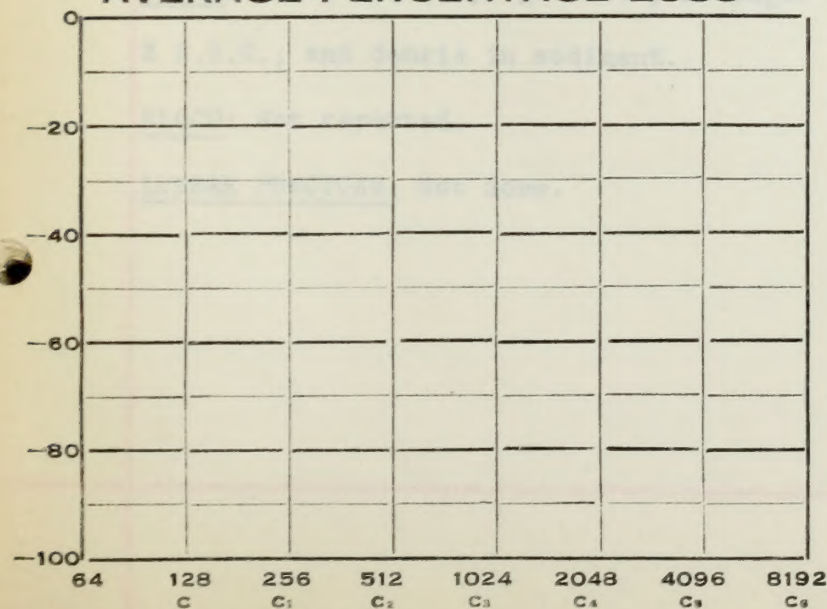
BLOOD: 80% Hgb. (2); R.B.C. 5,820,000; W.B.C. 11,900; R.B.C. normal, platelets normal; Kahn negative; R.F. 23; Pressure 100/60. Pus from urine sediment showed Gram negative diplococci.

EVANS MEMORIAL**AUDIOGRAM**NAME W. Q. 731 149
DATE 19

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber Right at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

..... Rinne $\frac{AC}{BC}$

..... Weber

..... Upper Limit

..... Lower Limit

..... Whisper

..... Voice

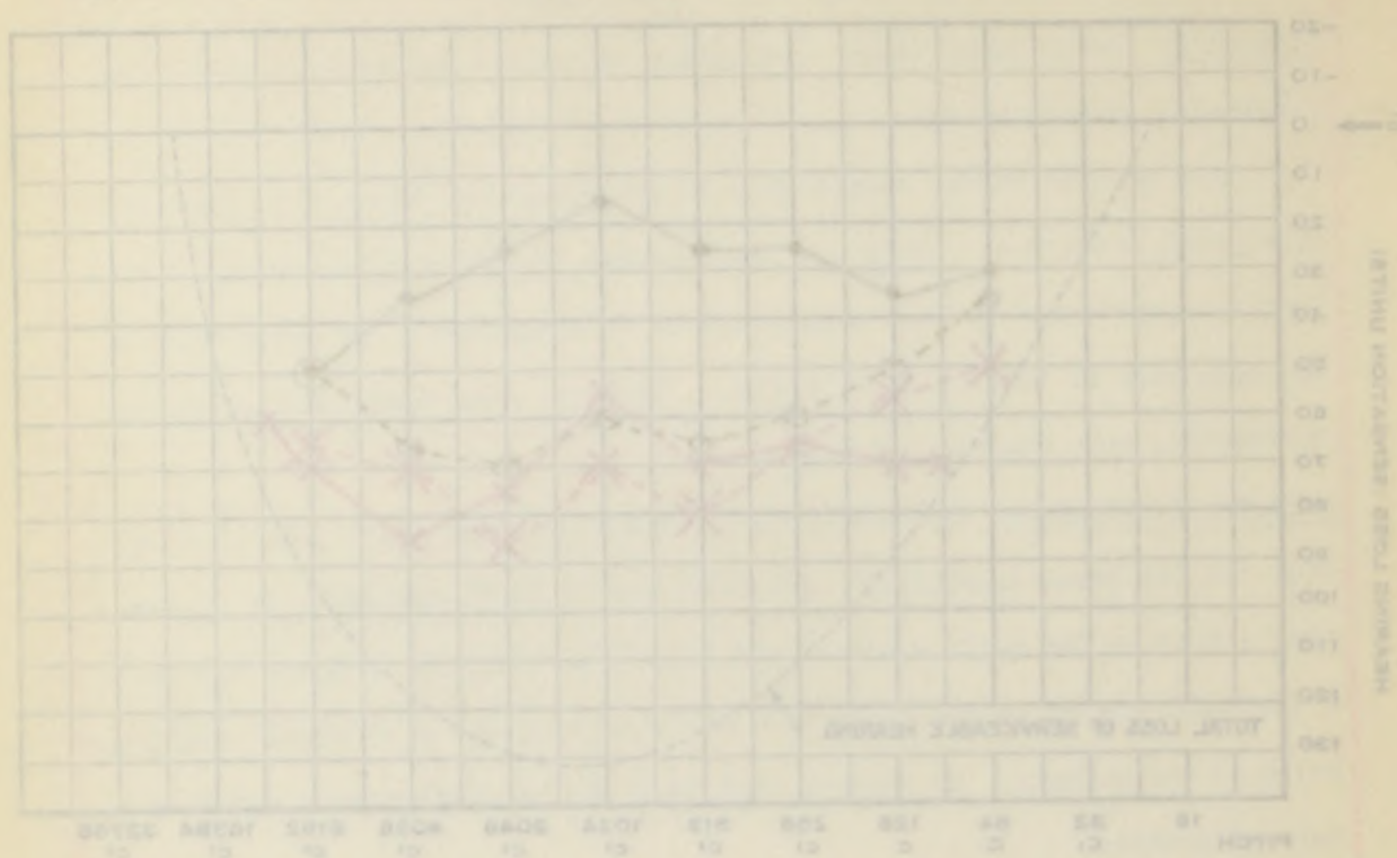
EVANS MEMORIAL

731 149

W. A.

DATE

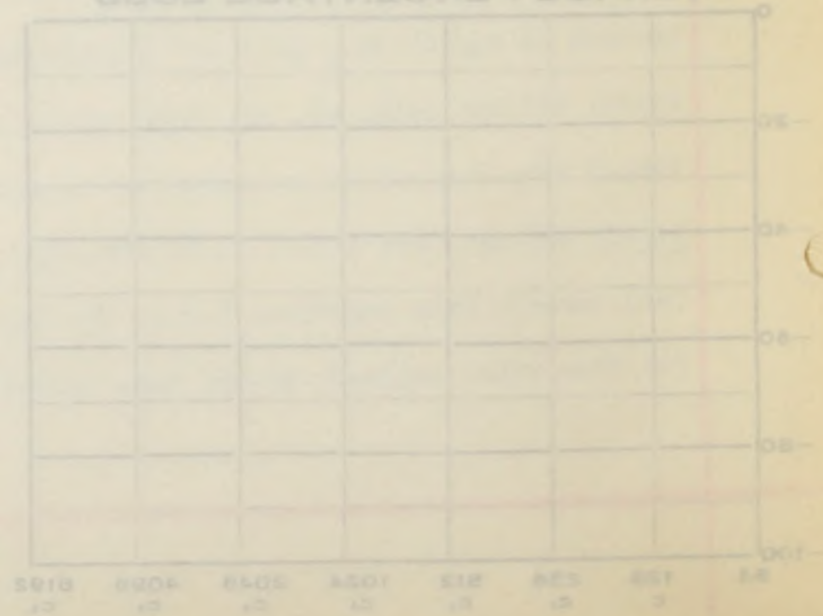
AUDIOGRAM



Frequency Hearing Loss
High Ear
Low Ear

Weber Right at 4000 Hz

AVERAGE PERCENTAGE LOSS



- 1. Gait
- 2. Vision
- 3. Hearing
- 4. Taste
- 5. Smell
- 6. Touch
- 7. Pain
- 8. Temperature

Right
Left
Upper limb
Lower limb
Neck
Head
Face
Eyes
Ears
Nose
Mouth
Throat
Lungs
Heart
Stomach
Intestines
Liver
Pancreas
Spleen
Kidneys
Bladder
Prostate
Vagina
Uterus
Ovaries
Testes
Penis
Scrotum
Vulva
Clitoris
Labia
Perineum
Anus
Rectum
Sigmoid Colon
Cecum
Appendix
Gallbladder
Pancreas
Stomach
Duodenum
Jejunum
Ileum
Cecum
Sigmoid Colon
Rectum
Anus

EVANS MEMORIAL

AUDIOGRAM

W... Q...: #731,149; Male; Age 36; White; Married.

DIAGNOSIS: Chronic suppurative otitis media with chronic mastoiditis.

For the past week there has been considerable dizziness together with discharge from the right ear. Two weeks ago the patient was exposed and contracted a severe upper respiratory infection which forced him to bed. There has been a generalized headache and since the ear started discharging he has noticed a paralysis of the right side of the face. He has been troubled with the right ear since childhood, a discharge issuing from it at various times, occasionally stopping completely. For some little time now a deafness of the left ear has been noticed.

PHYSICAL EXAMINATION: The tense portion of the drumskin was absent on the right ear but the flaccid portion remained intact. The left membrane was considerably retracted and showed a large, bulging scar in the posterior, inferior quadrant. The nose and pharynx were somewhat inflamed and injected. The right side of the face showed paralysis to both volitional and emotional motions. X-ray plates showed infections of the upper right, first, second and third molars.

NEUROLOGICAL EXAMINATION: Not done.

URINE: Pale; acid; sp. gr. 1016; no sugar nor albumen; 6 to 8 W.B.C.; 1 to 2 R.B.C.; and debris in sediment.

BLOOD: Not reported.

LUMBAR PUNCTURE: Not done.

Weber Right at Vertex

Diagnosis
Differential
Chief Complaint

1. Deafness
2. Pain
3. Headache
4. Vertigo
5. Stiffness
6. Discharge

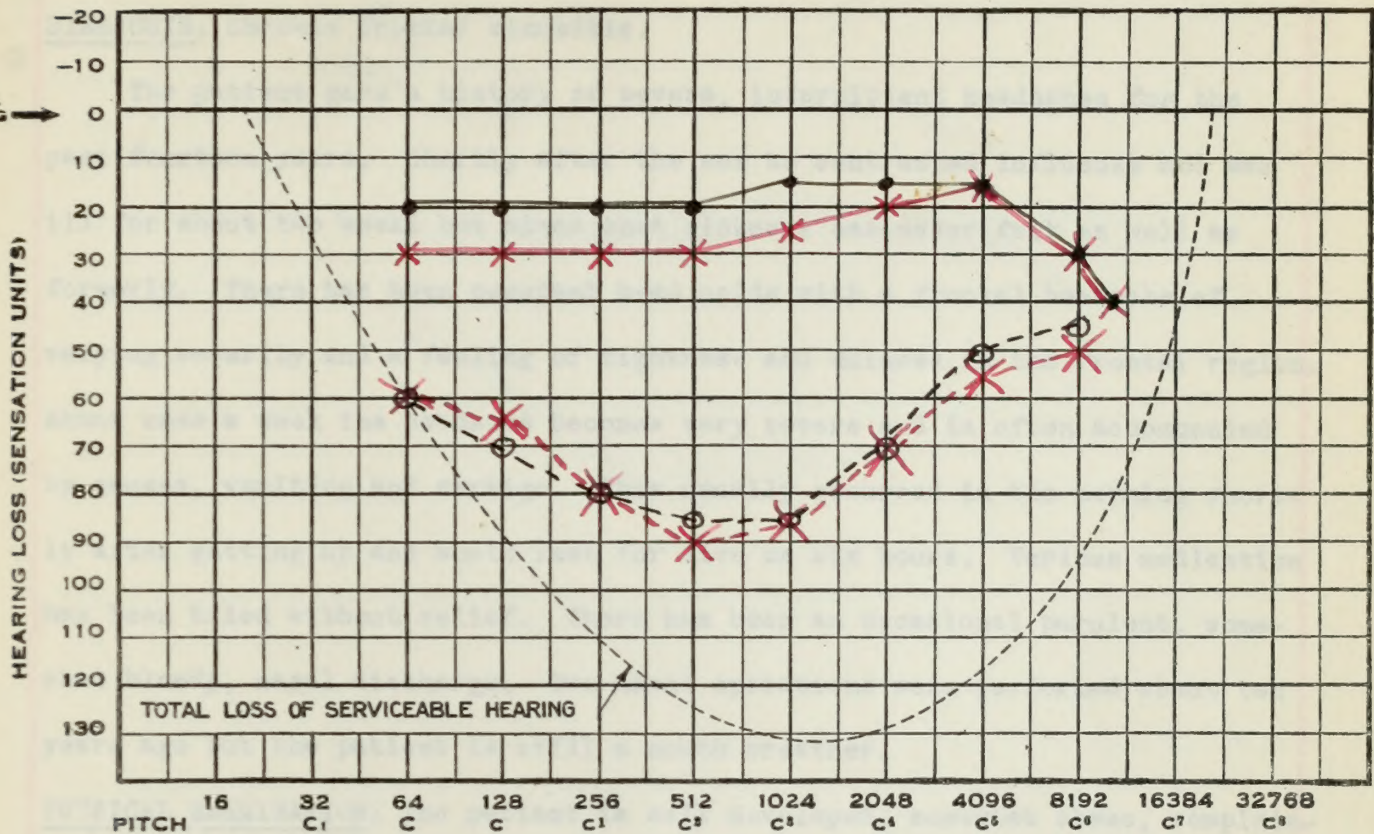
EVANS MEMORIAL

AUDIOGRAM

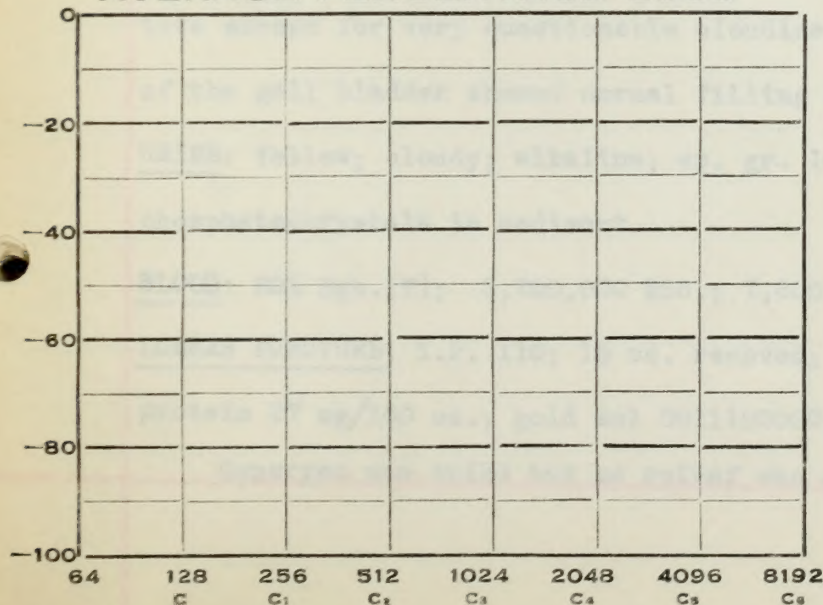
NAME E. J. G.

744676

DATE..... 19.....



AVERAGE PERCENTAGE LOSS



Weber Right at { Vertex
Forehead
= at { Nose bridge
Chin

Disease

Duration

Chief Symptom.....

1. Deafness.....

2. Pain.....

3. Discharge.....

4. Tinnitus.....

5. Headache.....

6. Dizziness.....

Right

Left

Rinne $\frac{AC}{BC}$

Weber

Upper Limit

Lower Limit

Whisper

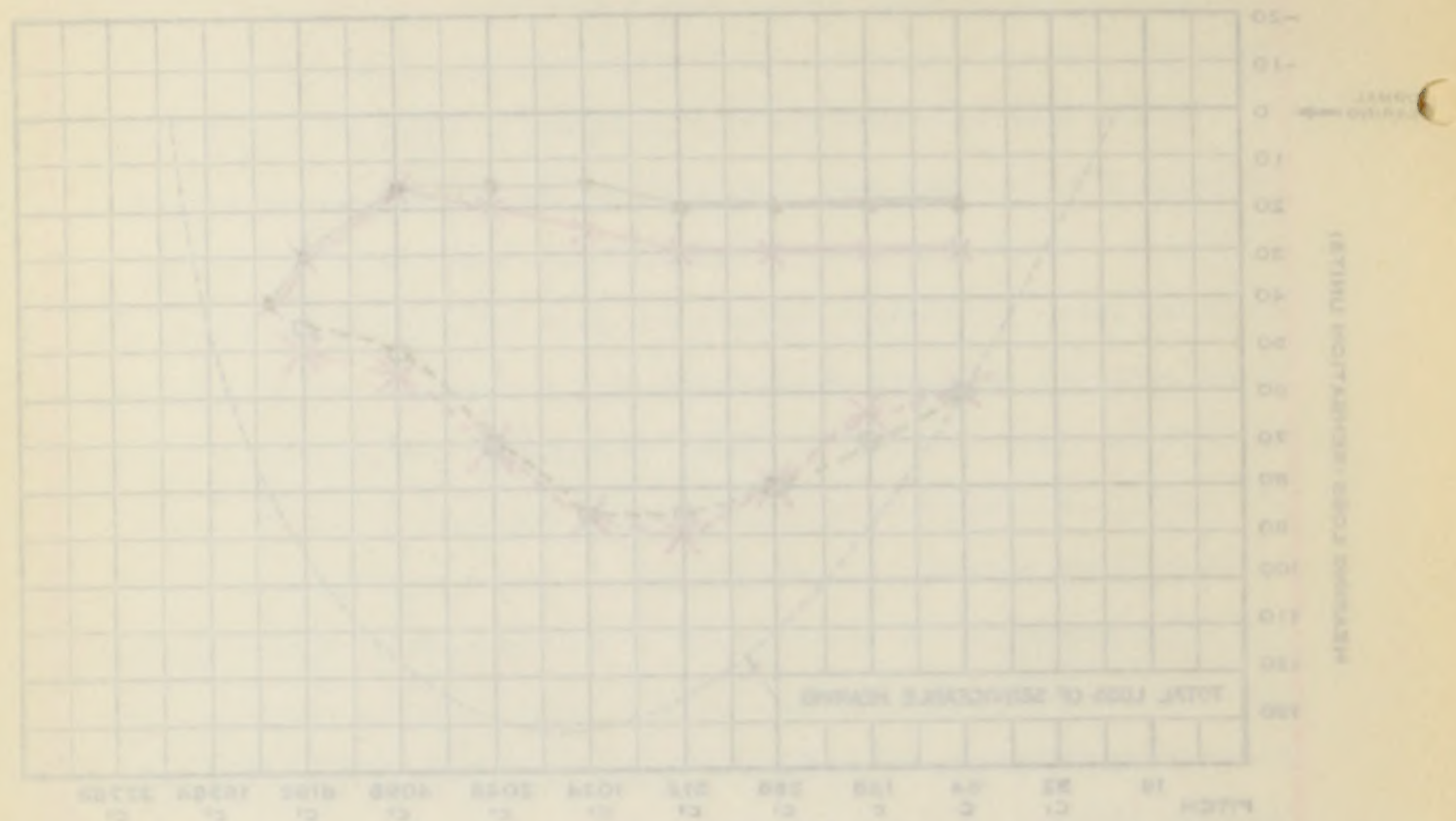
Voice

EVANS MEMORIAL

AUDIOGRAM

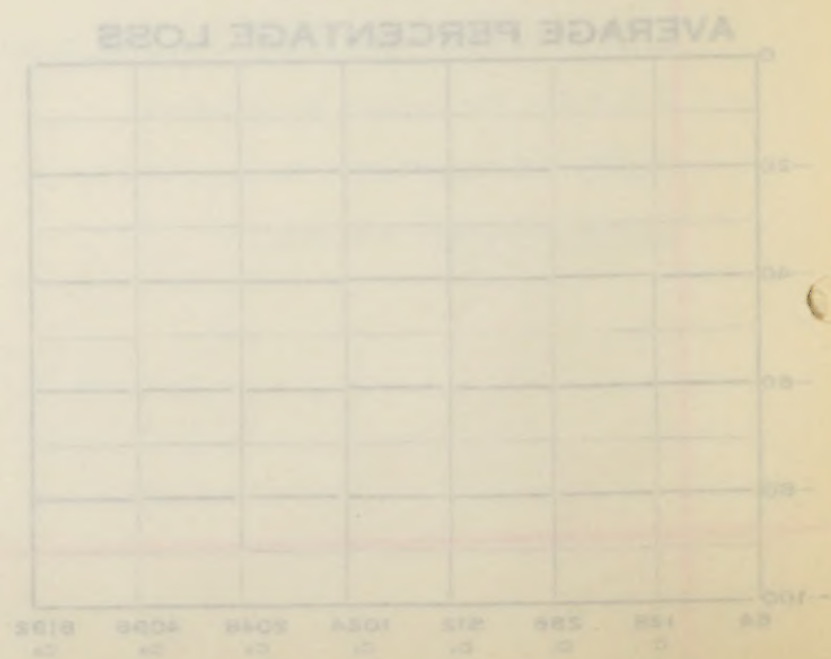
NAME F. J. O.
DATE

744676



Frequency Hearing Test
Right Ear
Left Ear

Webster Right at Forehead
= at Nose bridge
Chair



- Brain
- System
- Conduction
- 1. Distance
- 2. Time
- 3. Distance
- 4. Time
- 5. Distance
- 6. Time

Left
Right
Upper Limb
Lower Limb
Voice

E... G...; #744,676; Male; Age 41; White; Single.

DIAGNOSIS: Chronic frontal sinusitis.

The patient gave a history of severe, intermittent headaches for the past fourteen years. Shortly after the war he contracted influenza and was ill for about two weeks but since that sickness has never felt as well as formerly. There has been constant head colds with a frontal headache of varying severity and a feeling of tightness and dulness in the frontal region. About once a week the headache becomes very severe and is often accompanied by nausea, vomiting and vertigo. This usually occurred in the morning shortly after getting up and would last for five or six hours. Various medication has been tried without relief. There has been an occasional purulent, somewhat bloody, nasal discharge. Two nasal operations were performed about ten years ago but the patient is still a mouth breather.

PHYSICAL EXAMINATION: The patient is well developed, somewhat obese, complaining chiefly of a frontal headache. There was a septal spur in the left nostril and a slight enlargement of the right ankle due to an old strain.

NEUROLOGICAL EXAMINATION: The patient was left-handed, with essentially normal findings. There was some vaso-motor instability, but otherwise no pathology could be detected. X-rays of the skull and cervical spine were negative except for very questionable cloudiness of the frontal sinuses. X-rays of the gall bladder showed normal filling and emptying of oral dye.

URINE: Yellow; cloudy; alkaline; sp. gr. 1020; no sugar nor albumen; triple phosphates crystals in sediment.

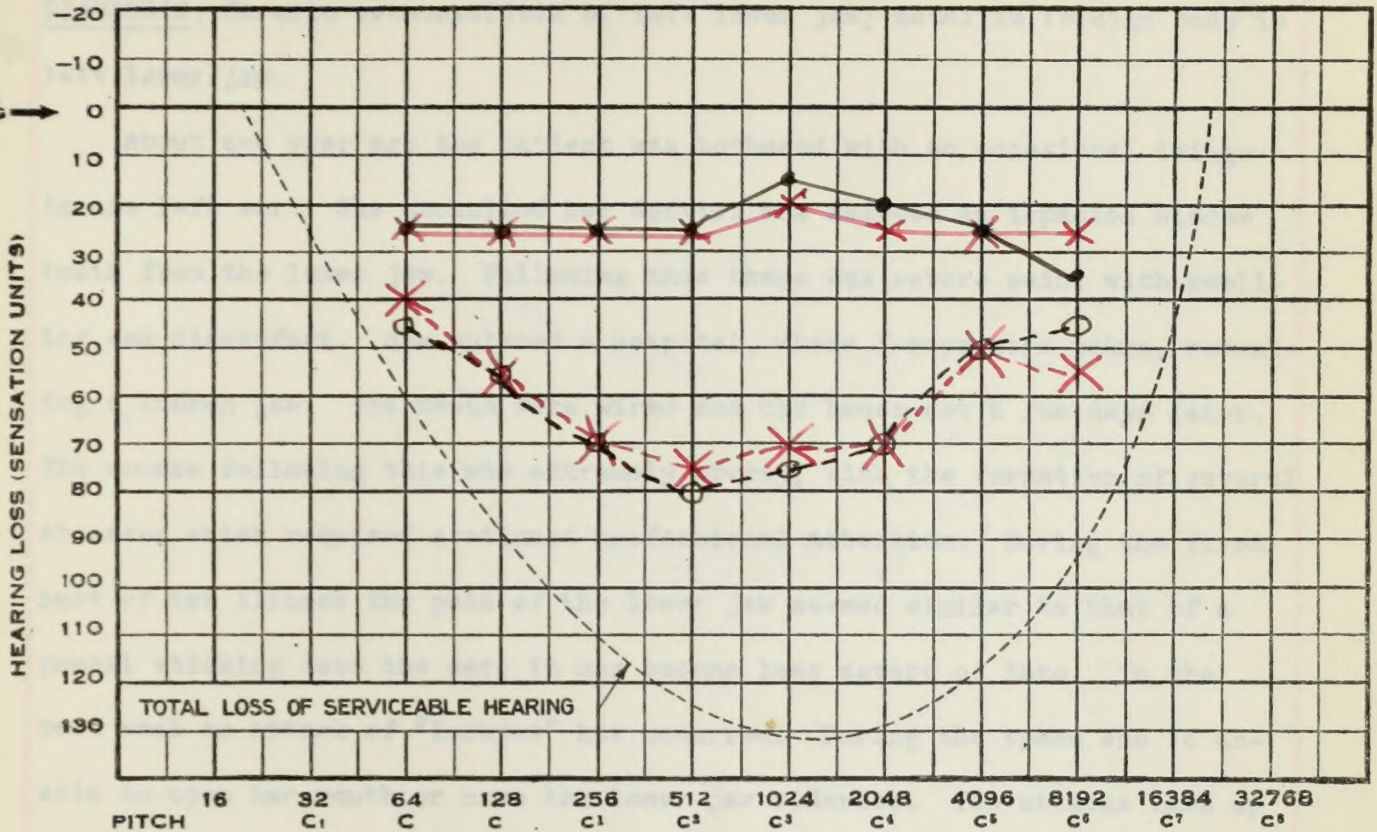
BLOOD: 80% Hgb.(T); 5,200,000 RBC.; 7,800 WBC.; Kahn negative; pr. 130/86.

LUMBAR PUNCTURE: I.P. 110; 15 cc. removed; F.P. 70; 3 WBC; positive Pandy; protein 27 mg/100 cc.; gold sol 0011100000; Wasserman negative.

Gynergen was tried but no relief was obtained from it.

EVANS MEMORIAL

AUDIOGRAM

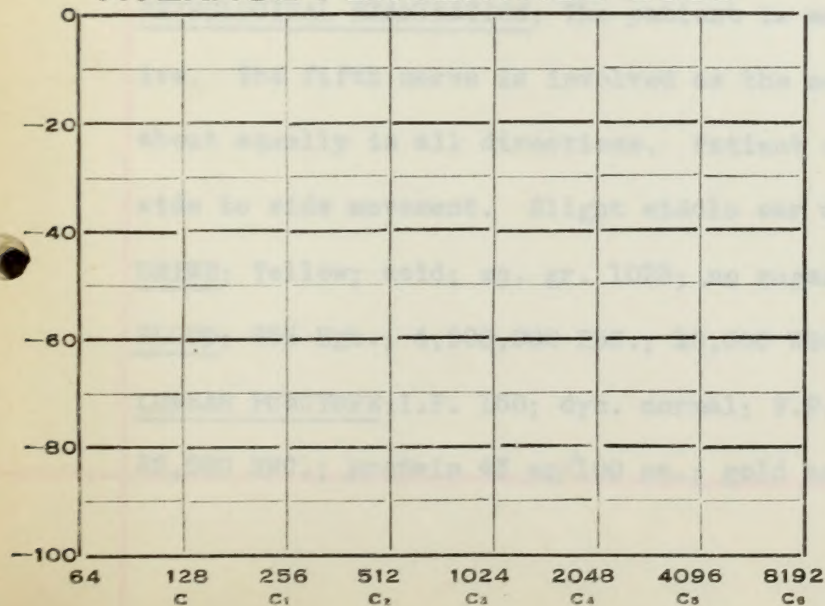
NAME M. B. B. 706 220
DATE 19

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber = at { Vertex
Chin
Left at { Forehead
Nose bridge

Disease
Duration
Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

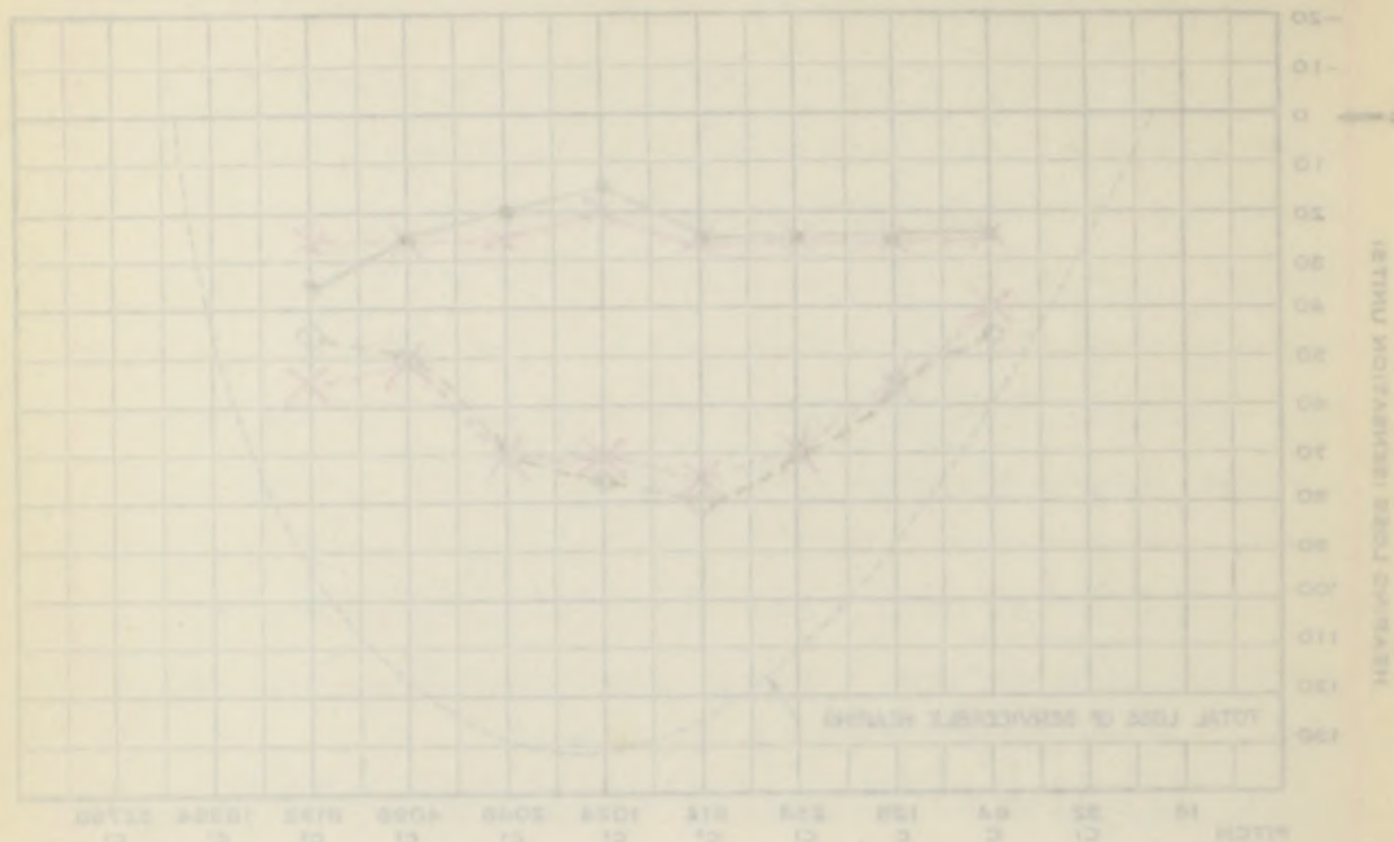
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

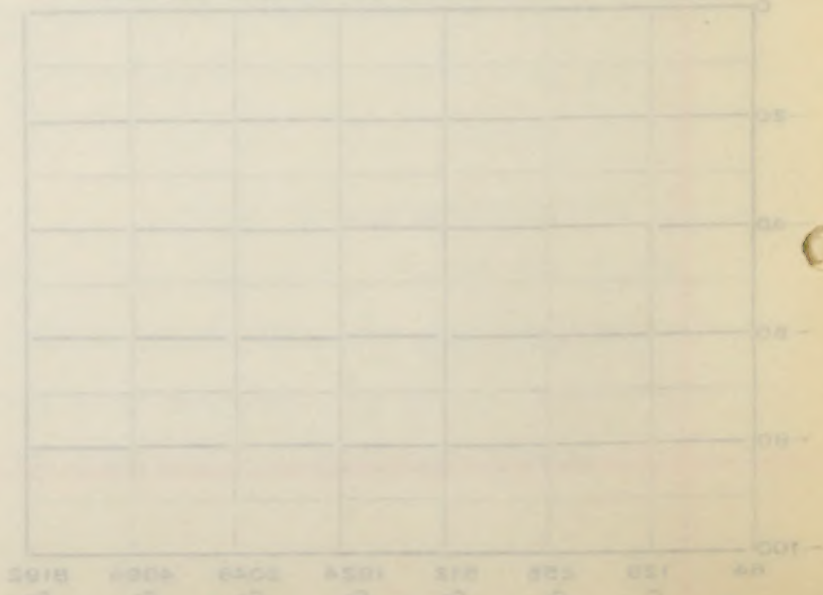
M. B. B.

704 220



Frequency Hearing Test
Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



- 1. Distance
- 2. Time
- 3. Distance
- 4. Time
- 5. Distance
- 6. Time

Right

Upper Limb
Lower Limb
Upper Limb
Lower Limb
Upper Limb
Lower Limb

Left at Forehead
Right at Chin
Weber = at

M...B...; #706,220; Female; Age 38; White; Single.

DIAGNOSIS: Chronic osteomyelitis of left lower jaw; metallic foreign body in left lower jaw.

About one year ago the patient was bothered with an occasional twinge in the left ear. She consulted her dentist who removed an impacted wisdom tooth from the lower jaw. Following this there was severe pain, with swelling and discomfort. She entered a hospital, where X-rays were taken, revealing a broken jaw. The teeth were wired and the bones set a few days later. The course following this was extremely stormy, with the formation of several abscesses which required continued professional attention. During the first part of her illness the pain of the lower jaw seemed similar to that of a pencil sticking into the ear; it has become less severe of late. In the past week an attack of "lockjaw" has occurred. During the spasm she is unable to open her mouth or move the lower jaw sidewise. The attacks last up to three or four hours, during which time she is only able to mumble through her teeth. They do not appear to be in any way connected with movements of the jaw.

PHYSICAL EXAMINATION: The woman is well developed and well nourished, not appearing ill, with all physical findings normal.

NEUROLOGICAL EXAMINATION: The patient is mentally normal and very co-operative. The fifth nerve is involved as the movements of the jaw are limited about equally in all directions. Patient complains of occasional grating on side to side movement. Slight middle ear deafness on the right side.

URINE: Yellow; acid; sp. gr. 1025; no sugar nor albumen.

BLOOD: 85% Hgb.; 4,900,000 RBC.; 10,000 WBC.; Kahn negative; pressure 160/100.

LUMBAR PUNCTURE: I.P. 150; dyn. normal; F.P. 100; bloody tap; 10 WBC.; 0 polys; 20,000 RBC.; protein 43 mg/100 cc.; gold sol 0122210000; Wasserman negative.

~~0.000 WAC : protein 48 m/100 aa : 0123710000 : Transmembrane derivative~~

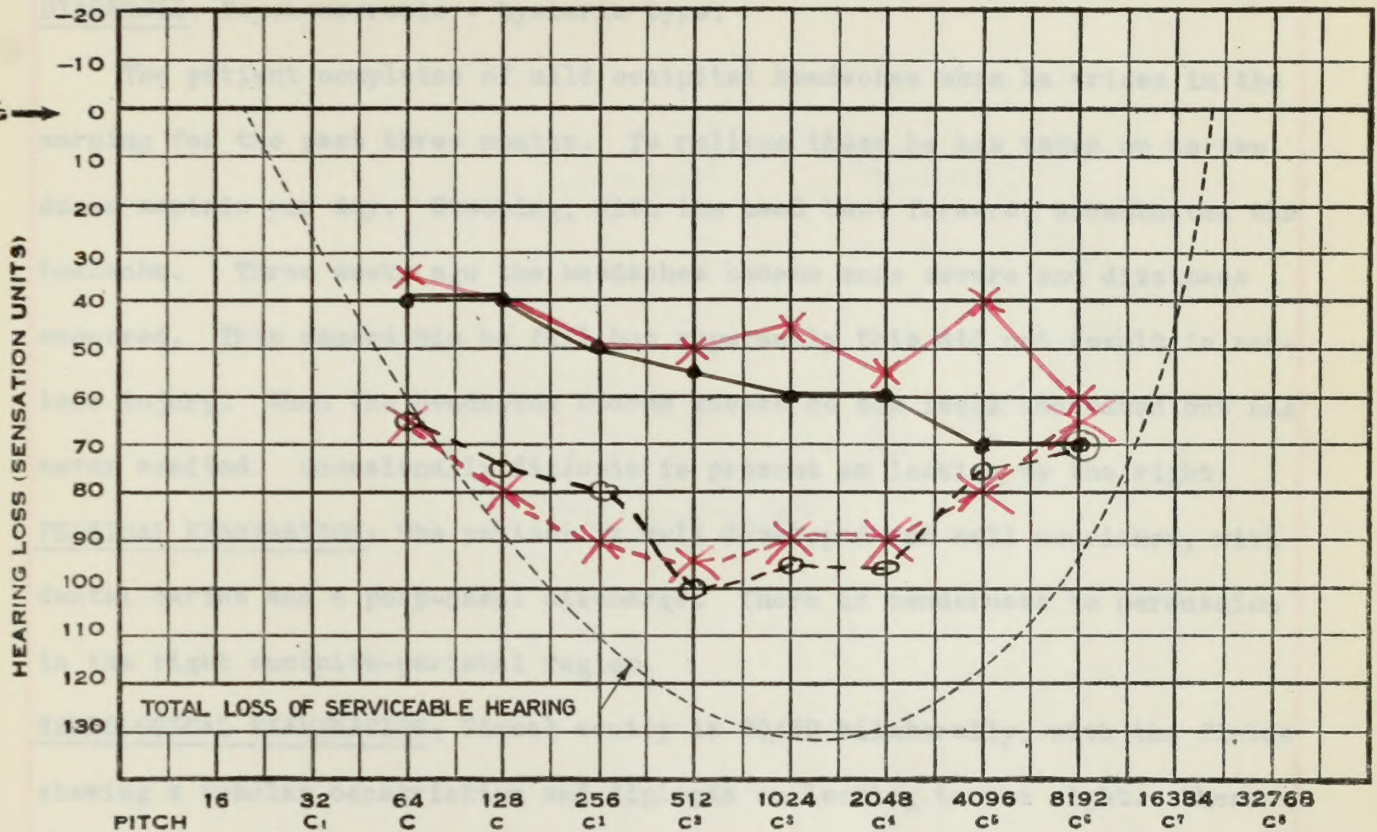
EVANS MEMORIAL**AUDIOGRAM**

NAME

*J. W.**733427*

DATE

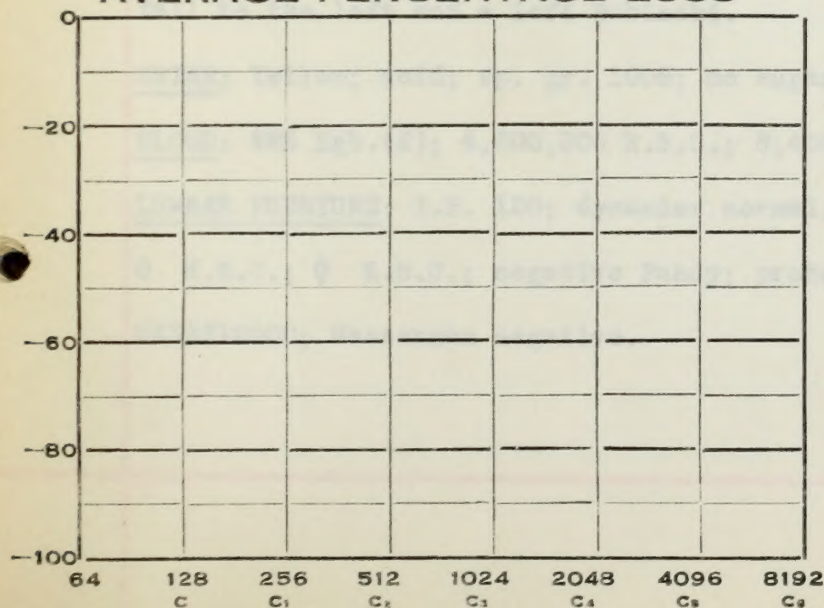
19



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber Right at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness.....

2. Pain.....

3. Discharge.....

4. Tinnitus.....

5. Headache.....

6. Dizziness.....

RightLeftRinne ^{AC}
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

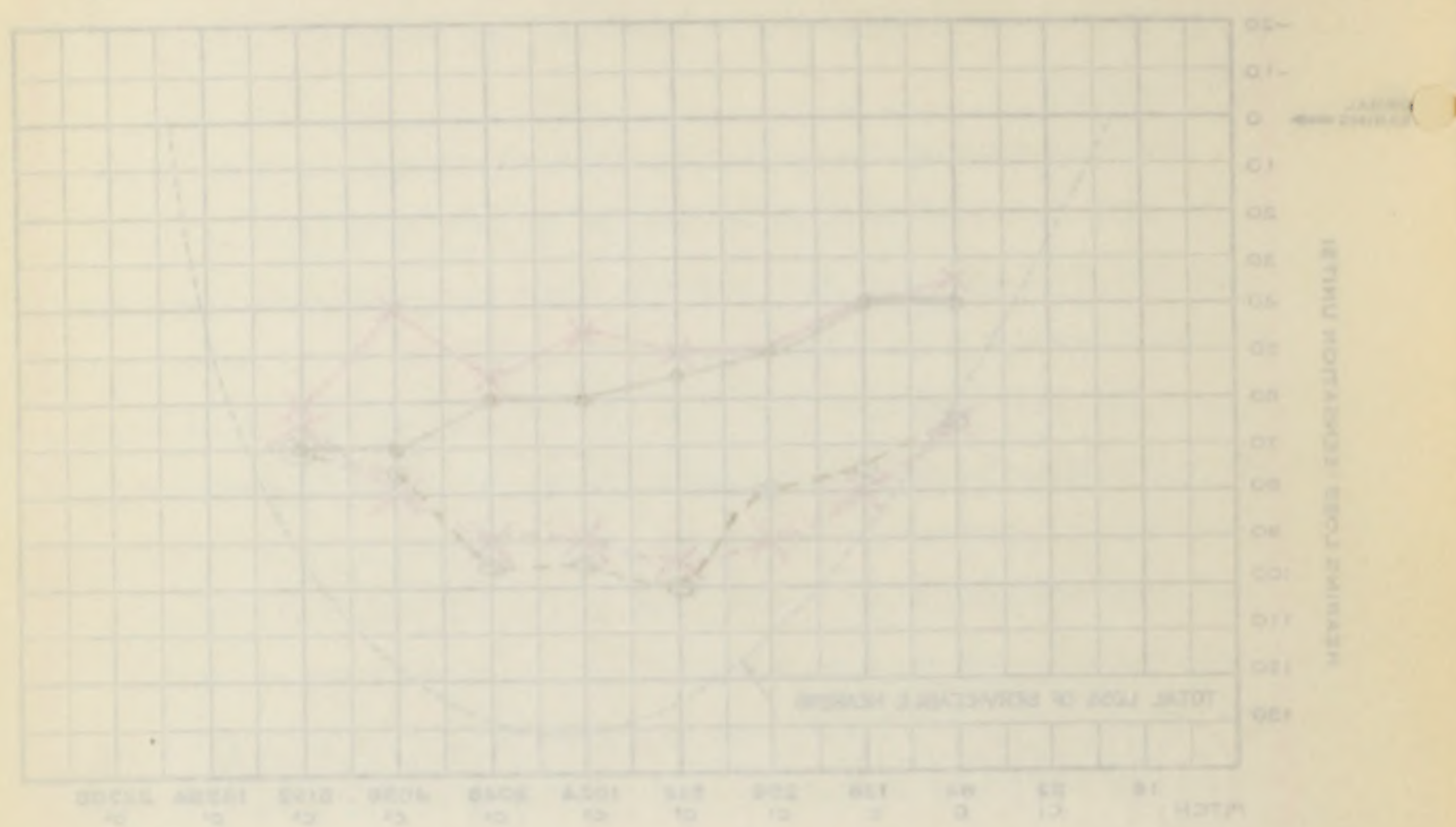
Voice.....

EVANS MEMORIAL

733447

NAME J.W.
DATE

AUDIOGRAM



John W...; #733,427; Male; Age 49; White; Single.

DIAGNOSIS: Psychoneurosis - hysteria type.

The patient complains of mild occipital headaches when he arises in the morning for the past three months. To relieve these he has taken up to two dozen aspirin per day. Stooping, with the head bent forward, accentuates the headache. Three weeks ago the headaches became more severe and dizziness occurred. This caused him to fall but apparently this did not result in serious injury. When the headaches become severe he now feels nauseated but has never vomited. Occasionally diplopia is present on looking to the right.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, with dental caries and a post-nasal discharge. There is tenderness to percussion in the right occipito-parietal region.

NEUROLOGICAL EXAMINATION: Visual acuity is 20/60 bilaterally, with the fields showing a tubular constriction and diplopia on looking to the right. There is a bilateral hearing involvement and a horizontal nystagmus. Movements are somewhat asynergic on the left with slight adiadokokinesis and tremor of the outstretched hands. The legs, shoulder and pelvic girdles seem weak. There is impaired position sense of the fingers and toes, with diminished vibratory sense of the ulnae and tibiae. The Romberg is positive with a tendency to fall to the left and a left Babinski.

URINE: Yellow; acid; sp. gr. 1008; no sugar nor albumen.

BLOOD: 88% Hgb.(S); 4,600,000 R.B.C.; 8,400 W.B.C.; N.P.N. 17; Kahn negative.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; F.P. 90; appearance normal;

0 W.B.C.; 0 R.B.C.; negative Pandy; protein 45 mg/100 cc.; gold sol

0233210000; Wasserman negative.

John W...; 4735, 42V; Wife; Age 49; White; Single.

DIAGNOSIS: Psychoneurosis - hysterical type.

The patient complains of mild occipital headaches when he arises in the morning for the past three months. To relieve these he has taken up to two dozen aspirin per day. Sleeping, with the head bent forward, accentuates the headaches. Three weeks ago the headaches became more severe and distressing. This caused him to fall but apparently this did not result in any injury. When the headaches become severe he now feels nauseated but has never vomited. Occasionally diplopia is present on looking to the right.

PHYSICAL EXAMINATION: The patient is well developed and well nourished, with dental caries and a post-nasal discharge. There is tenderness to percussion in the right occipito-parietal region.

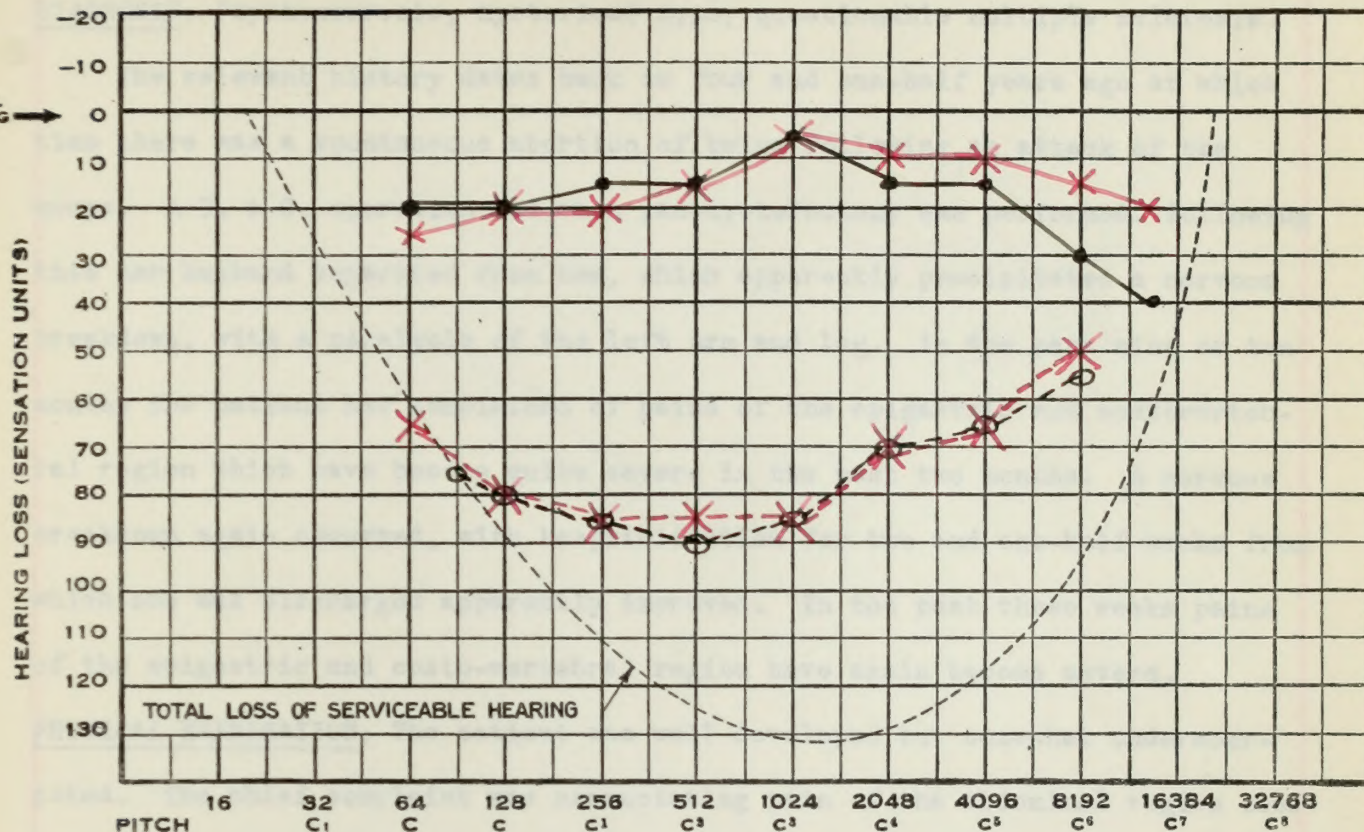
NEUROLOGICAL EXAMINATION: Visual acuity is 20/60 bilaterally, with the fields showing a tubular contraction and diplopia on looking to the right. There is a bilateral hearing involvement and a horizontal nystagmus. Movements are somewhat asymmetric on the left with slight adiadochokinesis and tremor of the outstretched hands. The legs, shoulder and pelvic girdles seem weak. There is impaired position sense of the fingers and toes, with diminished vibratory sense of the ulnar and tibial. The Romberg is positive with a tendency to fall to the left and a left Babinski.

URINE: Yellow; acid; sp. gr. 1.008; no sugar nor albumen.

BLOOD: Hgb. (S): 4,800,000 R.B.C.; 8,400 W.B.C.; N.P.E. 17; Kahn negative.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; P.E. 20; appearance normal;

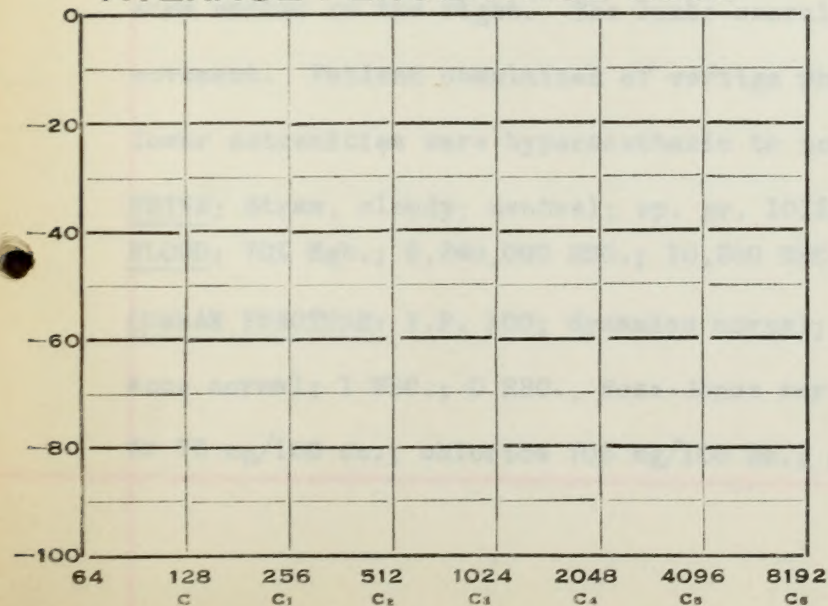
O.W.B.C.; 0 R.B.C.; negative Pandey; protein 45 mg/100 cc.; gold sol 023321000; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**NAME I.M. 743898
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber = at 4 Points

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeftRinne ^{AC}
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

I... M...; #743,898; Female; Age 23; White; Separated.

DIAGNOSIS: Psychoneurosis, hysterical type; questionable multiple sclerosis.

The relevant history dates back to four and one-half years ago at which time there was a spontaneous abortion of twins following an attack of the mumps. A D. & C. operation and then pan-hysterectomy was performed. Following this her husband separated from her, which apparently precipitated a nervous breakdown, with a paralysis of the left arm and leg. In the past nine or ten months the patient has complained of pains of the epigastric and costovertebral region which have become quite severe in the past two months. A nervous breakdown again occurred, with hospitalization for two and one-half weeks from which she was discharged apparently improved. In the past three weeks pains of the epigastric and costo-vertebral region have again become severe.

PHYSICAL EXAMINATION: The patient was well developed but somewhat undernourished. The chief complaint was excruciating pain of the abdominal region over the seventh rib in front and tenderness over the lumbar spine. The extremities were continually cold.

NEUROLOGICAL EXAMINATION: The patient appeared somewhat unhappy and depressed. The fundi were negative but a few unsustained nystagmoid jerks to the right and left were present. Both hands exhibited a coarse tremor on extension, more marked on the right. The lumbo-sacral region was tender to pressure and movement. Patient complained of vertigo when in a sitting position. The lower extremities were hyperaesthetic to touch and anesthetic to pain.

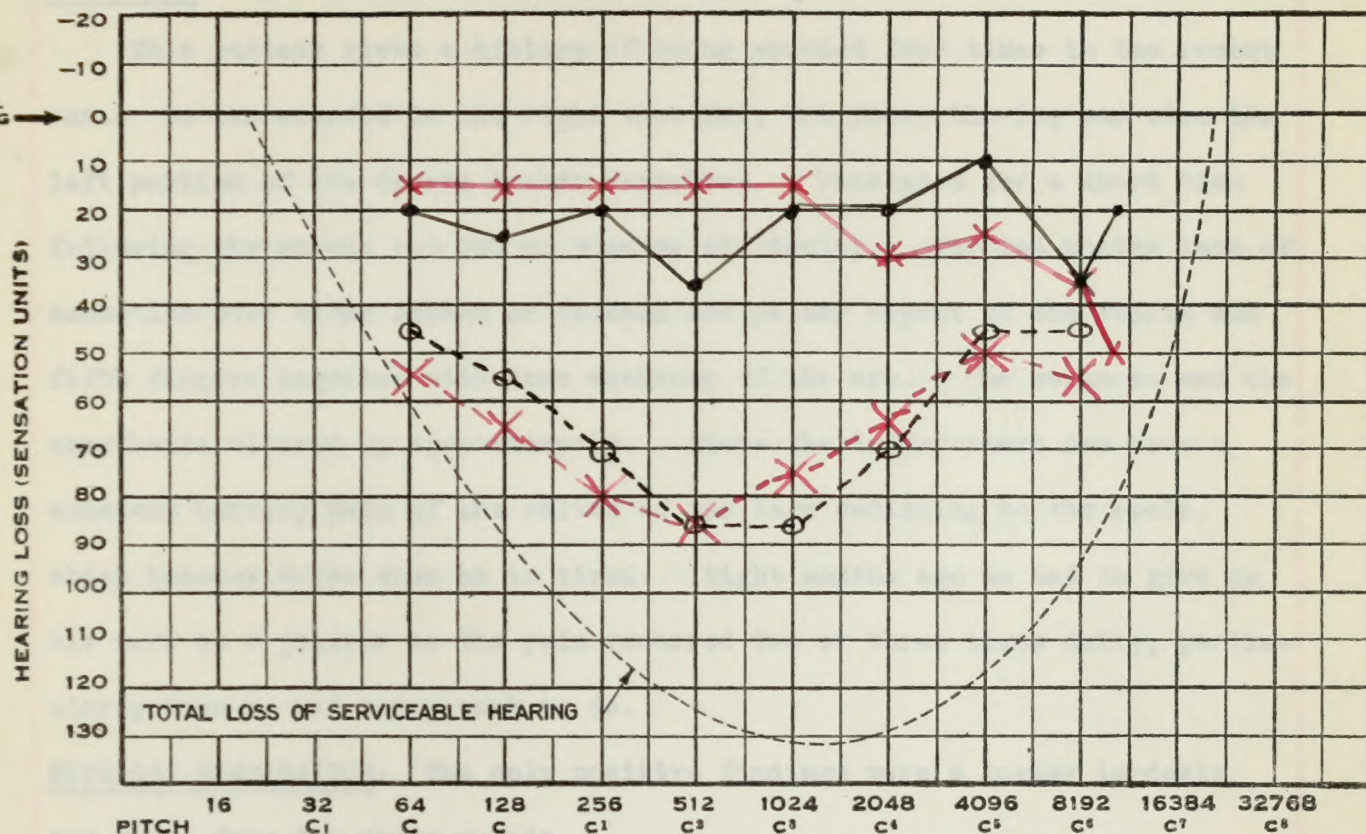
URINE: Straw, cloudy; neutral; sp. gr. 1012; no sugar nor albumen.

BLOOD: 70% Hgb.; 5,240,000 RBC.; 10,300 WBC.; Kahn negative; BS 91; pr. 110/70.

LUMBAR PUNCTURE: I.P. 100; dynamics normal; 30 cc. removed; F.P. 30; appearance normal; 1 WBC.; 0 RBC., Ross-Jones nor Pandy; protein 14 mg/100 cc.; sugar 76 mg/100 cc.; chloride 705 mg/100 cc.; gold sol 0011110000; Kahn negative.

EVANS MEMORIAL

AUDIOGRAM

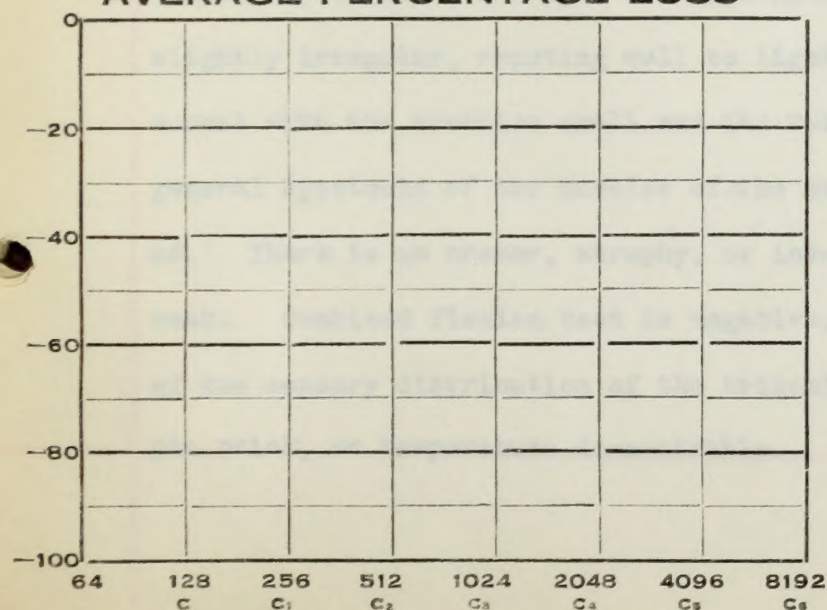
NAME A. B. 739259
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber = at 3 Points
Left at Chin

Disease.....

Duration.....

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

Right..... Left.....

Rinne AC.....

BC.....

Weber.....

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

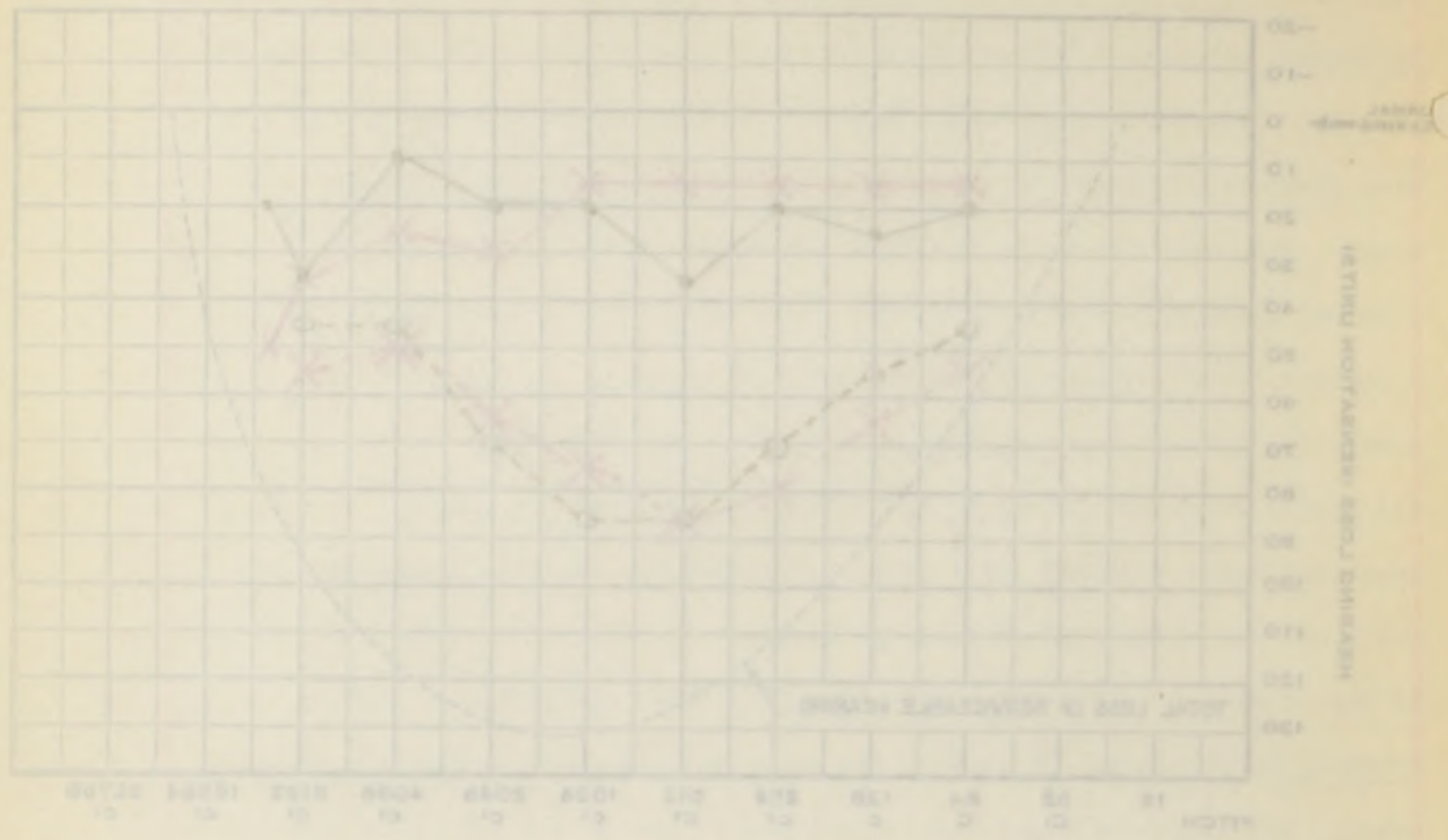
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

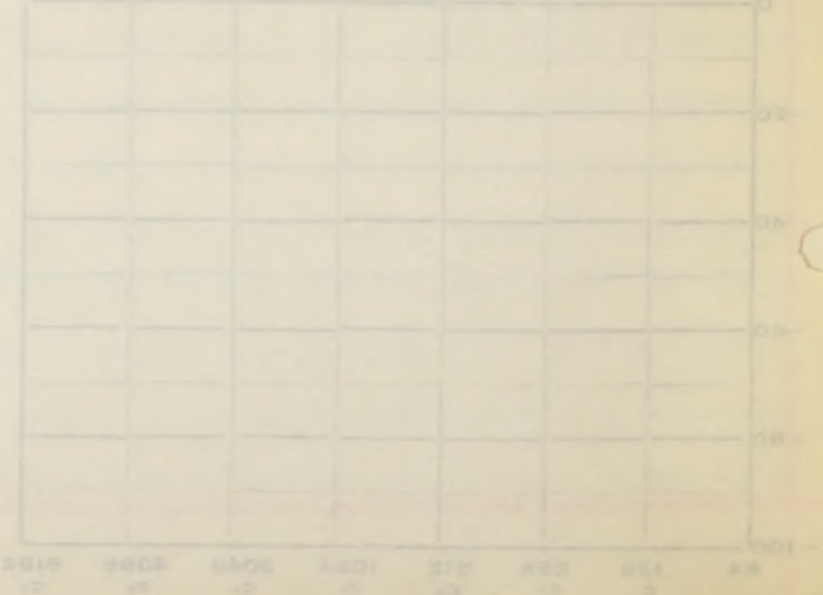
A.B.

729222



Left at Chin
Weber - at 3 Points

AVERAGE PERCENTAGE LOSS



- 1. Deafness
- 2. Deafness
- 3. Deafness
- 4. Deafness
- 5. Deafness
- 6. Deafness
- 7. Deafness
- 8. Deafness
- 9. Deafness
- 10. Deafness

Right
Left
Upper Limb
Lower Limb
Voice

A...D... , #739,259, Male, Age 53, White, Widower.

DIAGNOSIS: Psychoneurosis - hysterical type; post traumatic neurosis.

This patient gives a history of being wounded four times in the recent war. He was wounded in the right shoulder, the foot, the leg and also the left portion of the fourth lumbar vertebrae. Paralyzed for a short time following the wounds but had no bladder difficulty. For two months loss of sensation over ulnar aspect of forearm and palmar aspect of the fourth and fifth fingers together with some weakness of the arm. The weakness and the anesthesia cleared up spontaneously. Since the injury there has been a constant burning pain of the calves of the legs radiating to the heels, which becomes worse when he is tired. Eight months ago he had to give up his work as a janitor as the pain recurred two or three times daily, particularly when he had heavy work to do.

PHYSICAL EXAMINATION: The only positive findings were a lumbar lordosis and scars from the above wounds.

NEUROLOGICAL EXAMINATION: Patient is well oriented and cooperative. He is alert and not in apparent acute distress. He presents a very peculiar gait in that he leans forward to walk on the toes and also favors the left leg. There is pain on flexing of left thigh and some tenderness over the lower lumbar vertebrae. The eyes are hypermyopic with the pupils circular but slightly irregular, reacting well to light and accommodation. The discs are normal with the arteries small and the veins slightly ingorged. There is a general hypotonia of the muscles of the extremities which are soft and relaxed. There is no tremor, atrophy, or involuntary movements. Both legs are weak. Combined flexion test is negative. There is a slight hyperalgesia of the sensory distribution of the trigeminal nerve. No change to brush, pin prick, or temperature demonstrable. No adiadokokinesis or asteriognosis.

A... D..., #739,259, (continued).

The deep reflexes are slightly hyperactive but there is no clonus. Abdominal reflexes normal. also cremasteric. No Babinski, Oppenheim, or Gordon-Holmes could be elicited. Skin stroke test shows slightly increased dermatographia. There is an occasional extrasystole.

LUMBAR PUNCTURE: I.P. 150; dynamics normal; 15 cc. removed; F.P. 80; appearance normal; 3 W.B.C.; 0 polys; 0 R.B.C.; negative Ross-Jones and Pandy; protein 36 mg/100cc.; gold sol 0011100000; Wasserman negative.

URINE: Amber; acid; sp. gr. 1012; no albumen or sugar; sediment negative.

BLOOD: 100% Hgb.(S); R.B.C. 4,890,000; W.B.C. 7,400; Kahn negative.

X-rays of chest and stomach entirely normal.



AVERAGE PERCENTAGE LOSS

Weber Right at 4 Points

Name _____
 Location _____
 Chief Symptom _____
 1. Discharge _____
 2. Pain _____
 3. Discharge _____
 4. Tingling _____
 5. Headache _____
 6. Dizziness _____
 Date _____

A... D... 6753, 1933 (continued).

The deep reflexes are slightly hyperactive but there is no clonus. Abdominal reflexes normal. No Babinski, Oppenheim, or Gordon-Holmes could be elicited. Skin stroke test shows slightly increased sensitivity.

1a. There is an occasional extrasystole.

LABORATORY: I.P. 150; glycemia normal; 15 cc. removed; W.P. 50; spec-

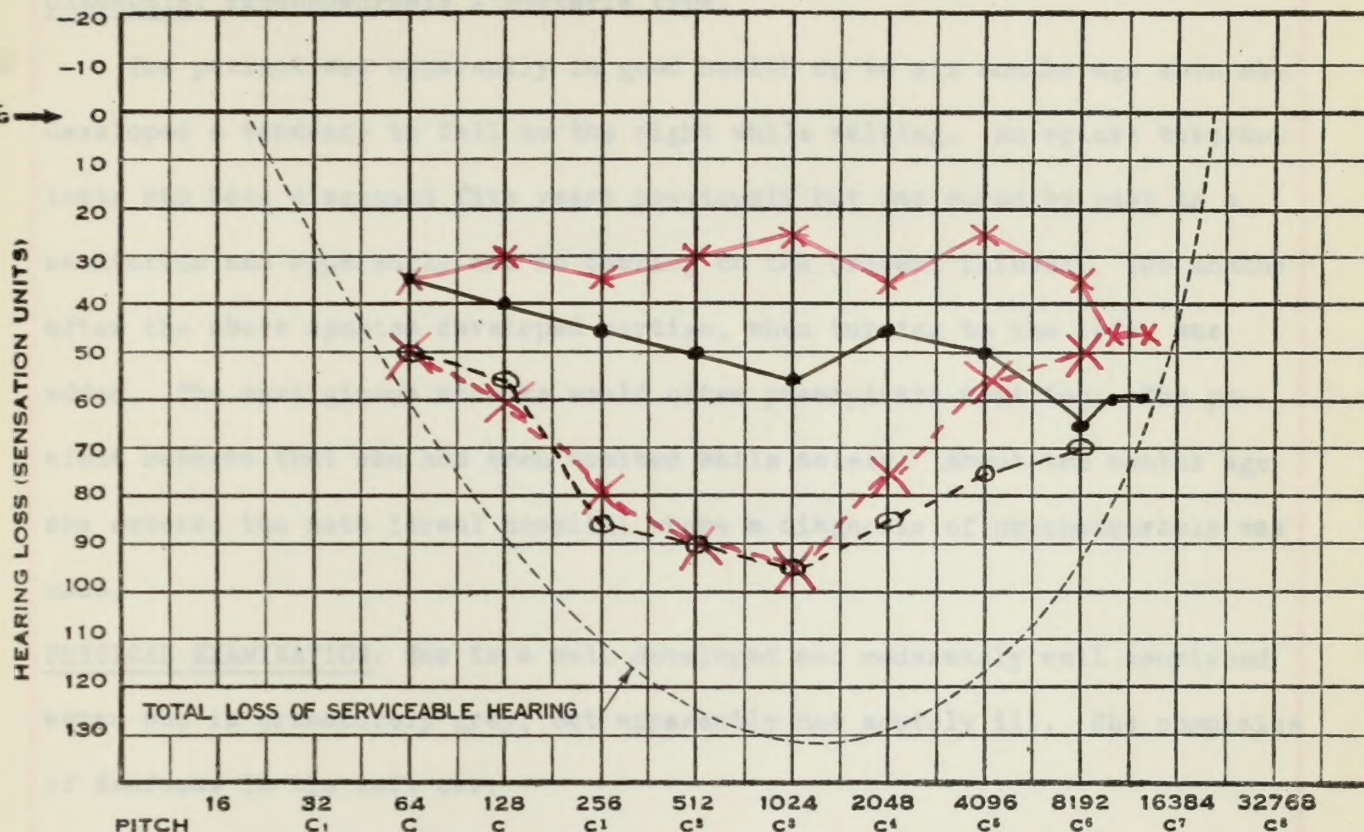
imen normal; S.W.C.; 0 pelvis; 0 R.P.C.; negative Ross-Jones and Landy;

protein 35 mg/100cc.; gold sol 00110000; Wassermann negative.

URINE: Amber; acid; sp. gr. 1012; no albumen or sugar; sediment negative.

BLOOD: 1000 R.P.C.; R.P.C. 4,800,000; W.B.C. 7,400; Kahn negative.

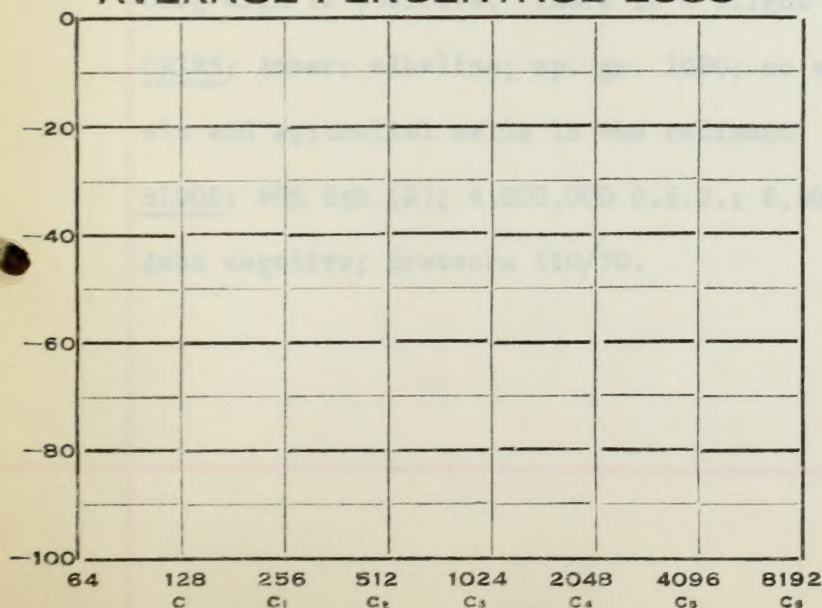
X-rays of chest and stomach entirely normal.

EVANS MEMORIAL**AUDIOGRAM**NAME A.F. 736 822
DATE 19

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber Right at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

EVANS MEMORIAL

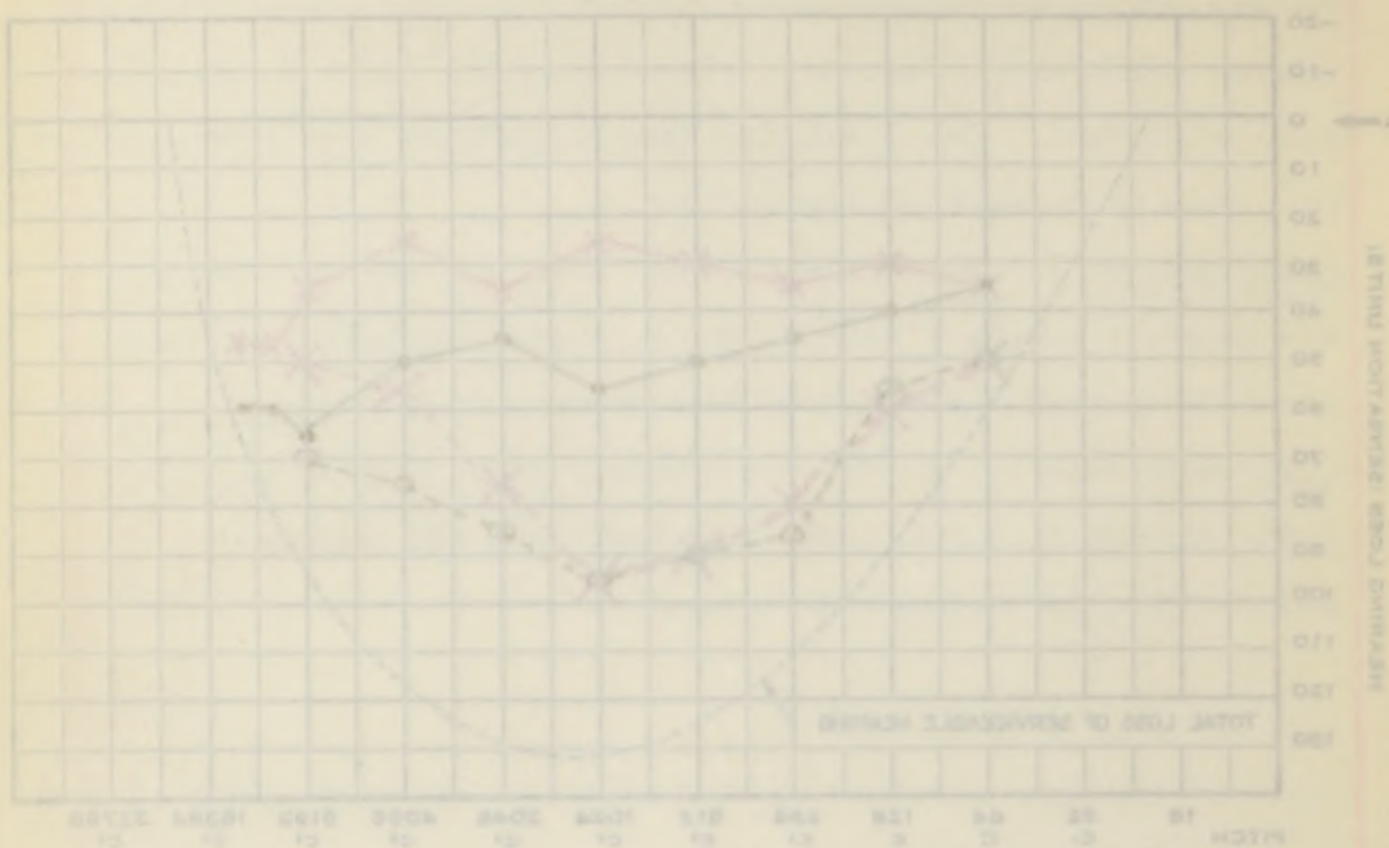
AUDIOGRAM

NAME
DATE

H.F.

736122

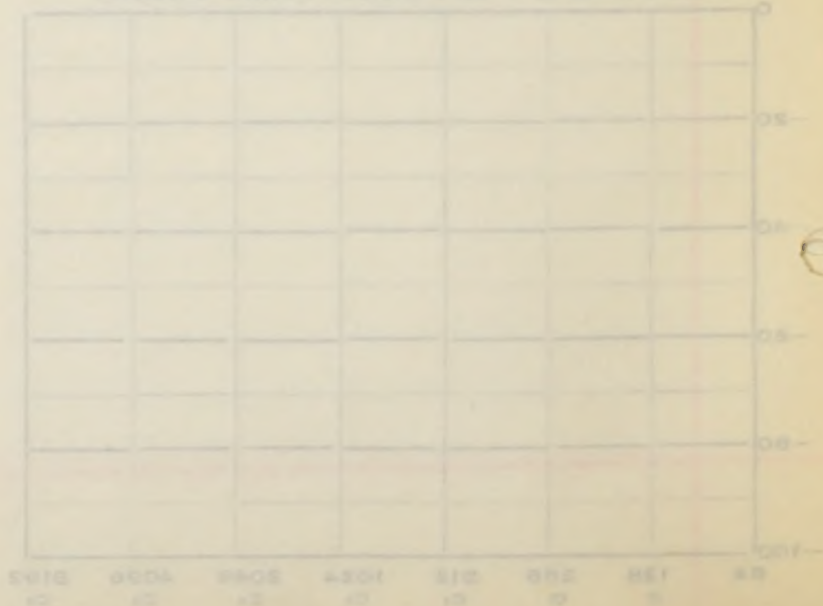
19



Forward Hearing Test
Right Ear
Left Ear

Weber Right at 4 Points

AVERAGE PERCENTAGE LOSS



Right
Left
Both
None
Unsure
Upper Limit
Lower Limit
White
None

A...F...; #736,822; Female; Age 32; White; Married.

DIAGNOSIS: Psychoneurosis - hysteria type.

The patient was apparently in good health up to six months ago when she developed a tendency to fall to the right while walking. An apical tuberculosis had been diagnosed five years previously but was cured by rest in a sanitarium and apparently has no bearing on the present illness. Two months after the above symptom developed vertigo, when turning to the left, was added. The vertiginous attacks would often precipitate vomiting. The patient reports that she has even vomited while asleep. About two months ago she entered the Beth Israel hospital where a diagnosis of psychoneurosis was made.

PHYSICAL EXAMINATION: She is a well developed and moderately well nourished woman who is prematurely gray, but apparently not acutely ill. She complains of deafness in the left ear.

NEUROLOGICAL EXAMINATION: The extra-ocular muscles fail to work synergically. The jaw deviates to the left on opening. There is hypalgesia and hyperthermesthesia of the left face, trunk and extremities. There is a slight atrophy of the right sterno-mastoid muscle. The gait is extremely bizarre, the feet being raised unusually high as the patient veers off to the right. The Romberg sign is positive. There is a slight sinus arrhythmia.

URINE: Amber; alkaline; sp. gr. 1020; no sugar nor albumen; phosphate crystals and epithelial cells in the sediment.

BLOOD: 96% Hgb.(S); 4,600,000 R.B.C.; 8,400 W.B.C.; N.P.N. 28; B.S. 68; Kahn negative; pressure 110/70.

A...; 4738, 522; Female; Age 32; White; Married.

DIAGNOSIS: Psychoneurosis - hysterical type.

The patient was apparently in good health up to six months ago when she developed a tendency to fall to the right while walking. An spinal tuberculous lesion had been diagnosed five years previously but was cured by rest in a sanatorium and apparently has no bearing on the present illness. Two months after the above symptoms developed vertigo, when turning to the left, was added. The vertiginous attacks would often precipitate vomiting. The patient reports that she has even vomited while asleep. About two months ago she entered the Beth Israel Hospital where a diagnosis of psychoneurosis was made.

PHYSICAL EXAMINATION: She is a well developed and moderately well nourished woman who is presumably grey, but apparently not acutely ill. She complains of deafness in the left ear.

NEUROLOGICAL EXAMINATION: The extra-ocular muscles fail to work synergically. The jaw deviates to the left on opening. There is hypalgnesia and hyperesthesia of the left face, trunk and extremities. There is a slight atrophy of the right sternocleidomastoid muscle. The gait is extremely staccato, the feet being raised unusually high as the patient varies off to the right. The Romberg sign is positive. There is a slight ataxic gait.

URINE: Acid; alkaline; sp. gr. 1020; no sugar nor albumen; phosphate crystals and epithelial cells in the sediment.

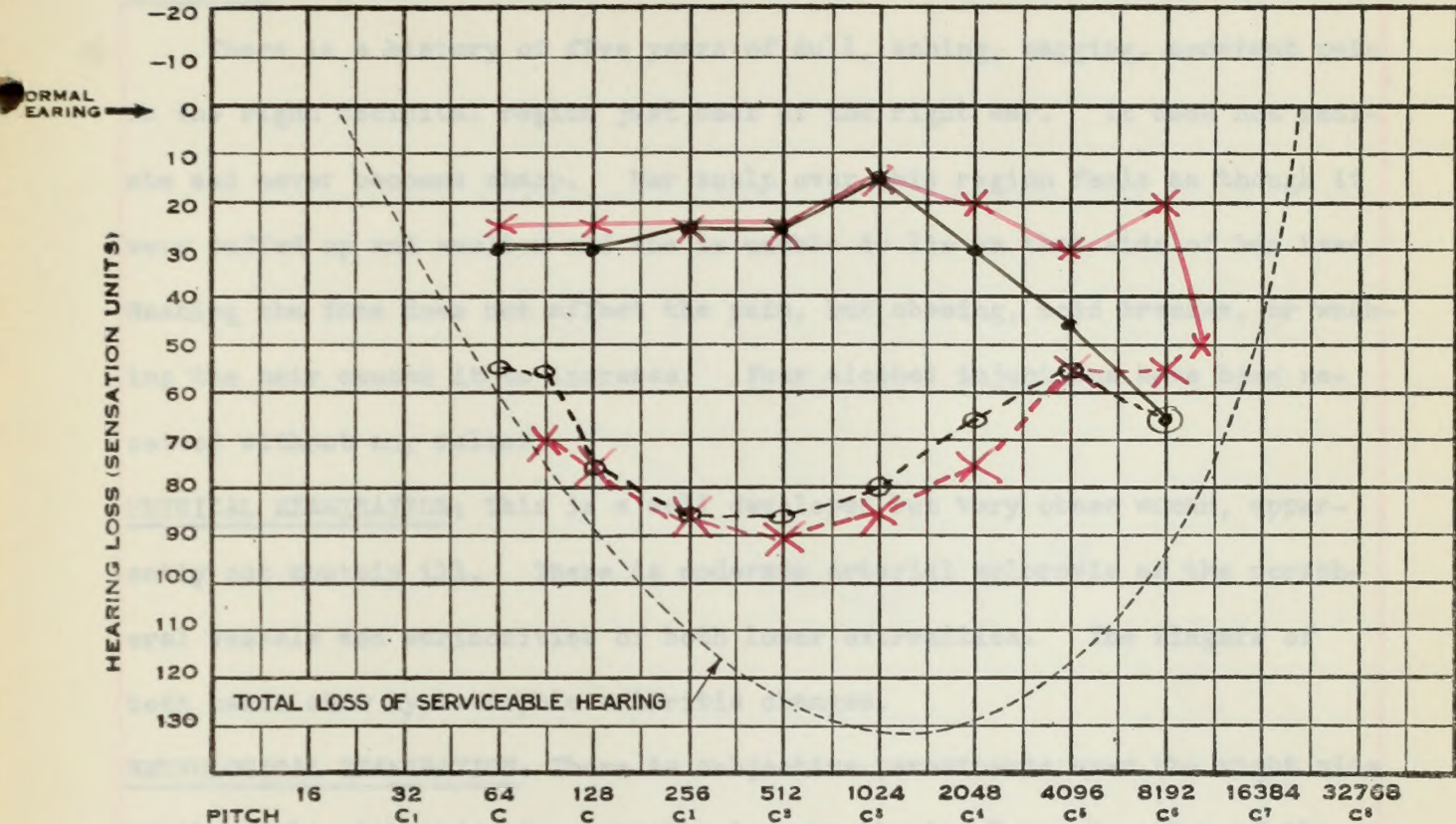
BLOOD: Hgb. (3); 4,800,000 R.B.C.; 8,400 W.B.C.; 11.5 W.H. 33; 5.2, 5.8.

Kahn negative; pressure 110/70.

EVANS MEMORIAL

AUDIOGRAM

NAME A. H. 738941
DATE _____ 19__

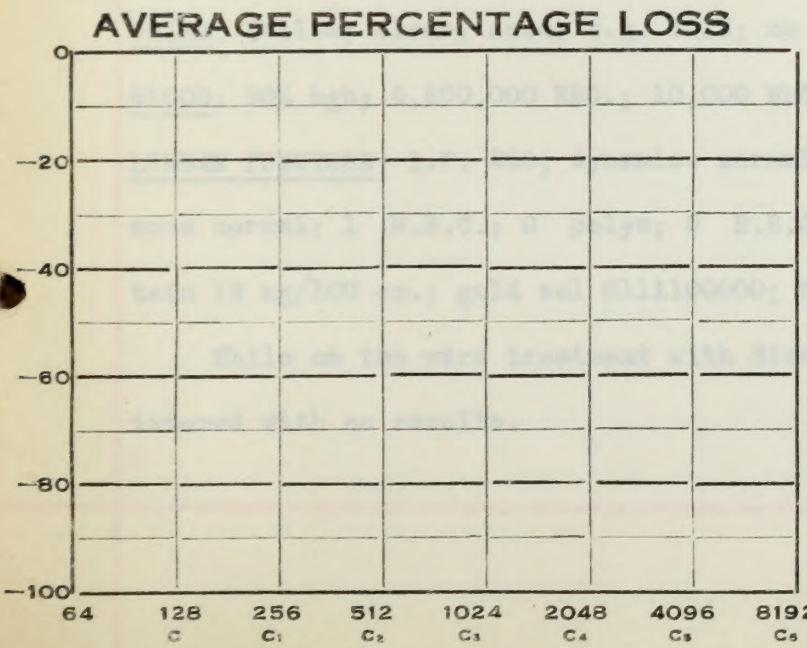


Percentage Hearing Loss

Right Ear

Left Ear

Weber Left at 4 Points.



Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

Right Left

Rinne AC BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

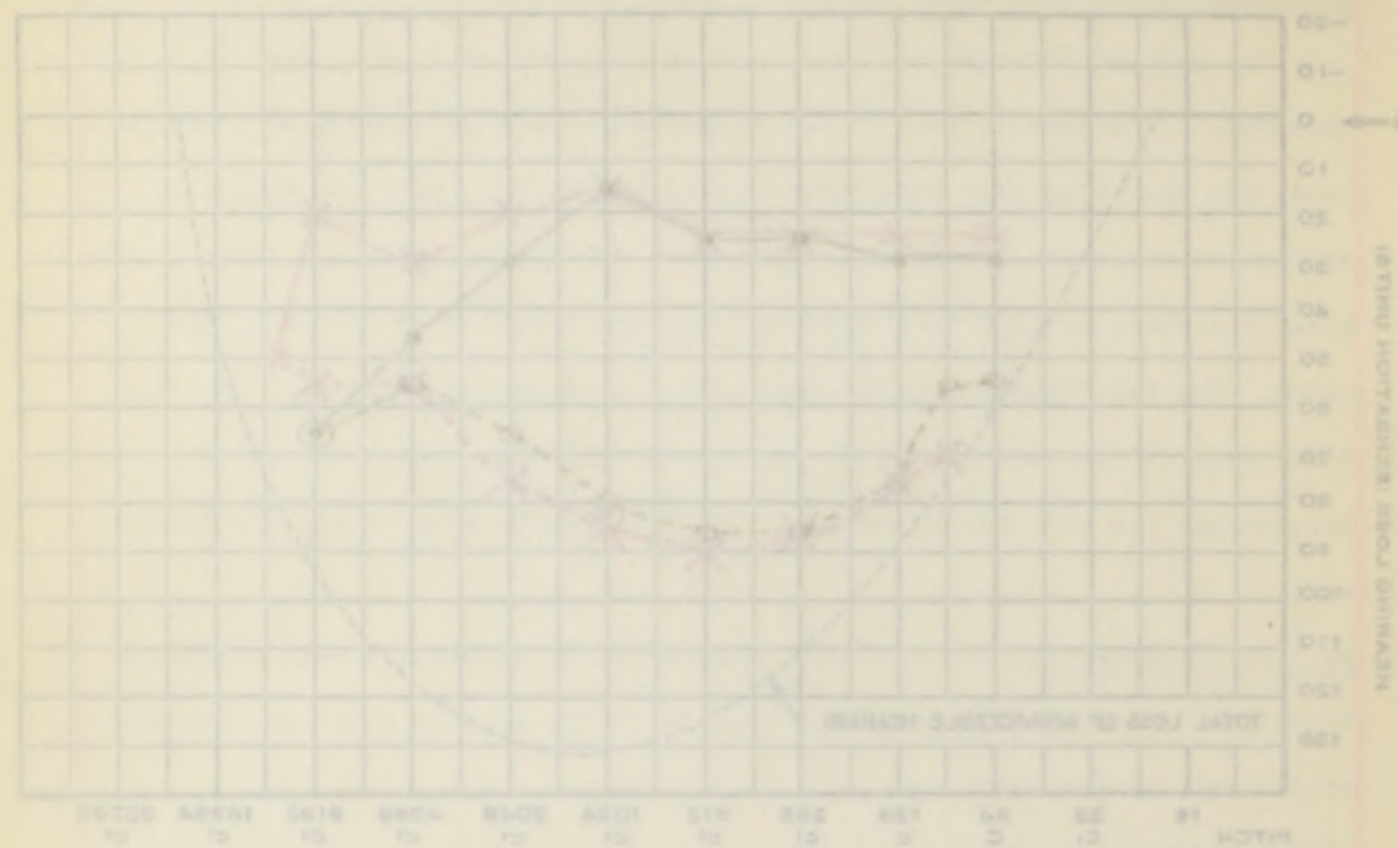
EVANS MEMORIAL

138941

A.H.

NAME
DATE

AUDIOGRAM



EVANS MEMORIAL

A...H...; #738,941; Female; Age 62; White; Widow.

DIAGNOSIS: Psychoneurosis- hysterical type; auriculo temporal neuralgia.

There is a history of five years of dull, aching, nagging, constant pain in the right occipital region just back of the right ear. It does not radiate and never becomes sharp. Her scalp over this region feels as though it were puffed up and swollen and she is unable to lie on that side of her head. Washing the face does not affect the pain, but chewing, cold breezes, or washing the hair causes it to increase. Four alcohol injections have been received without any relief.

PHYSICAL EXAMINATION: This is a well developed but very obese woman, apparently not acutely ill. There is moderate arterial sclerosis of the peripheral vessels and varicosities of both lower extremities. The fingers of both hands show hypertrophic arthritic changes.

NEUROLOGICAL EXAMINATION: There is subjective paresthesia over the right side of the scalp with objective hypesthesia over the two lower branches of the fifth nerve. There is a complete hemihypusthesia of the right half of the body which becomes a complete anesthesia in the lower leg and thigh of that side. The discs are normal; there is a slight swelling at the base behind the right mastoid.

URINE: Yellow; clear; acid; s.g. 1015; no sugar nor albumen; sediment negative.

BLOOD: 90% hgb; 4,500,000 RBC.; 10,000 WBC.; Kahn negative; pressure 110/80.

LUMBAR PUNCTURE: I.P. 250; dynamics normal; 20 cc. removed; F.P. 140; appearance normal; 1 W.B.C.; 0 polys; 0 R.B.C.; No Ross-Jones nor Pandy; protein 19 mg/100 cc.; gold sol 0111100000; Wasserman negative.

While on the ward treatment with diathermy and salicylates were administered with no results.

A...H...; 4735, 441; Female; Age 32; White; Widow.

DIAGNOSIS: Psychoneurosis - hysterical type; auricular temporal neuralgia.

There is a history of five years of dull, aching, nagging, constant pain in the right occipital region just back of the right ear. It does not radiate and never becomes sharp. Her scalp over this region feels as though it were pulled up and swollen and she is unable to lie on that side of her head. Washing the face does not affect the pain, but chewing, cold presses, or washing the hair causes it to increase. Four alcohol injections have been received without any relief.

PHYSICAL EXAMINATION: This is a well developed but very obese woman, apparently not acutely ill. There is moderate arterial sclerosis of the peripheral vessels and verticillates of both lower extremities. The fingers of both hands show hypertrophic arthritic changes.

NEUROLOGICAL EXAMINATION: There is subjective paresthesia over the right side of the scalp with objective hypaesthesia over the two lower branches of the fifth nerve. There is a complete hemihypaesthesia of the right half of the body which becomes a complete anaesthesia in the lower leg and thigh of that side. The discs are normal; there is a slight swelling at the base behind the right mastoid.

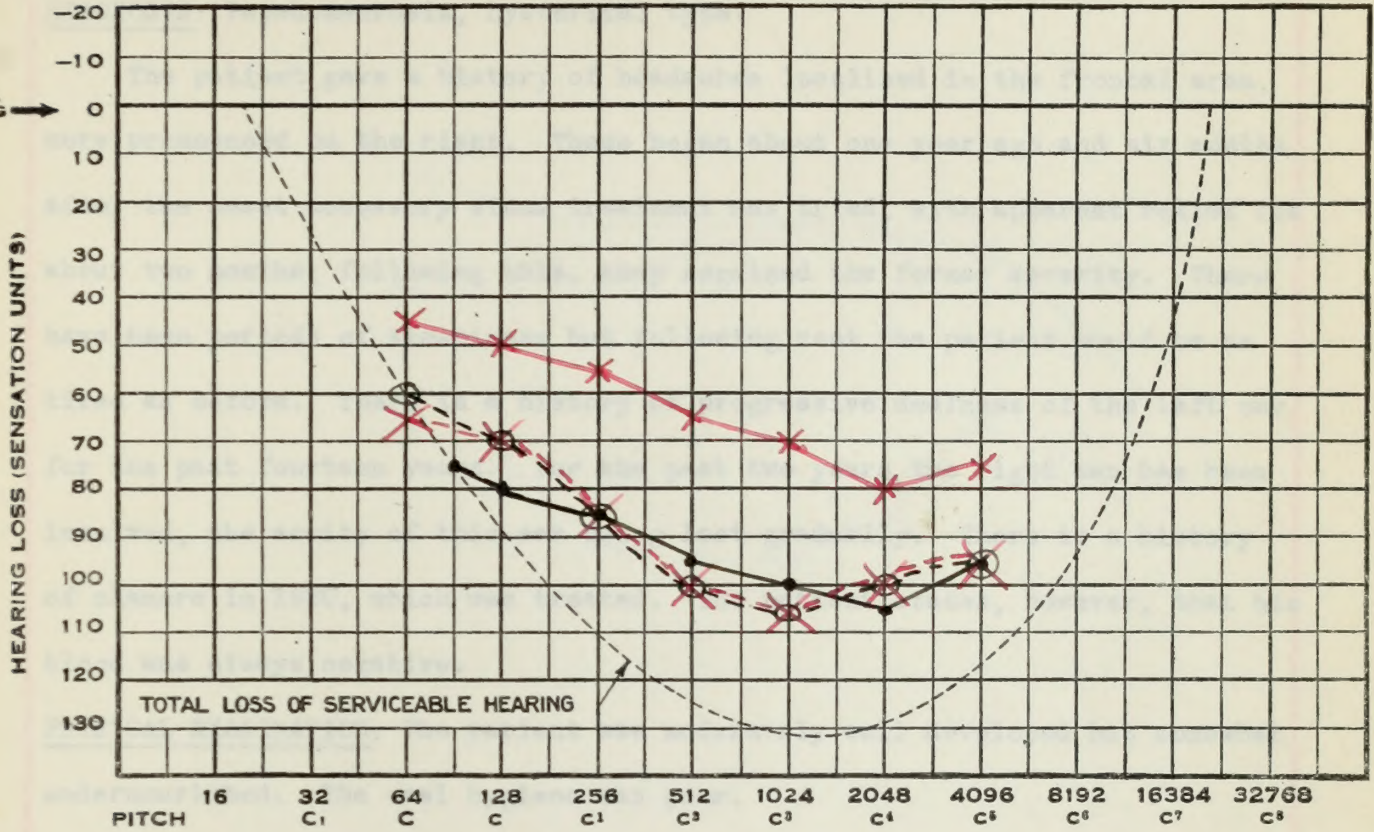
URINE: Yellow; clear; acid; s.g. 1018; no sugar nor albumen; sediment negative. BLOOD: RBC 4,500,000 WBC 10,000 HGB 45% Kohn negative; pressure 110/80. LUMBAR PUNCTURE: 1.5. 250; dynamics normal; 20 cc. removed; P.P. 140; appearance normal; 1 W.B.C.; 0 polya; 0 R.B.C.; No Ross-Jones nor Bangs; protein 18 mg/100 cc.; Gold sol 0.11100000; Wasserman negative.

While on the ward treatment with diathermy and salicylates were administered with no results.

EVANS MEMORIAL

AUDIOGRAM

NAME R.M. 741738
DATE 19

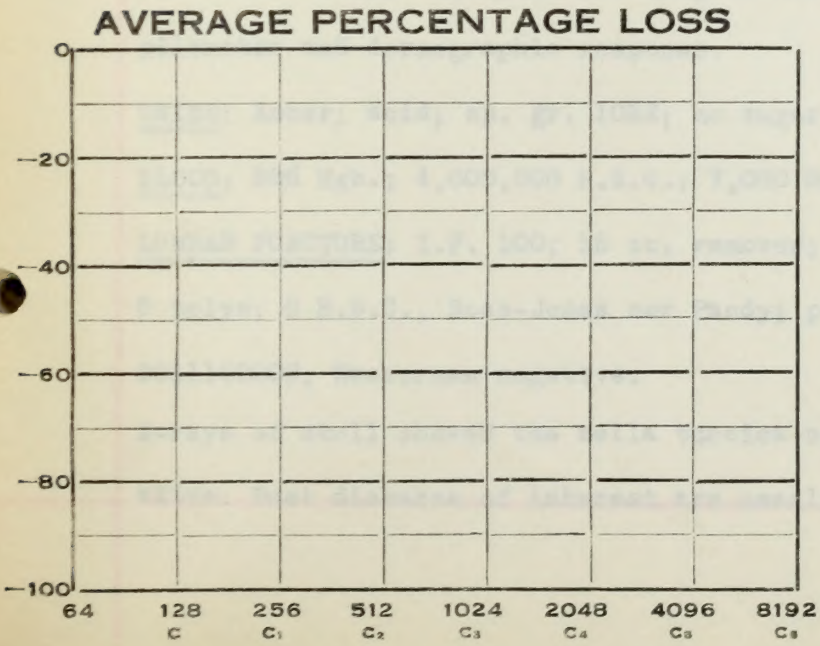


Percentage Hearing Loss

Right Ear

Left Ear

Weber Right at 4 Points



Disease

Duration

Chief Symptom.....

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right Left

Rinne ^{AC}/_{BC}

Weber

Upper Limit

Lower Limit

Whisper

Voice

R... M...; #741,738; Male; Age 32; White; Married.

DIAGNOSIS: Psychoneurosis, hysterical type.

The patient gave a history of headaches localized in the frontal area, more pronounced on the right. These began about one year ago and six months after the onset accessory sinus treatment was tried, with apparent relief for about two months; following this, they regained the former severity. There have been periods of sleepiness but following rest the patient would be as tired as before. There is a history of progressive deafness of the left ear for the past fourteen years. For the past two years the right ear has been involved, the acuity of this ear being lost gradually. There is a history of chancre in 1920, which was treated. The patient states, however, that his blood was always negative.

PHYSICAL EXAMINATION: The patient was moderately well developed but somewhat undernourished. The oral hygiene was poor.

NEUROLOGICAL EXAMINATION: The nasal margin of the right fundus appeared to be somewhat blurred. Hearing was reduced, the left more marked than the right. Dizziness has been present for one year. There was a moderately coarse tremor of the outstretched fingers. There was moderate sweating of the entire body, with some flushing of the neck and face, and a moderate pilomotor and dermatographic response.

URINE: Amber; acid; sp. gr. 1022; no sugar nor albumen.

BLOOD: 88% Hgb.; 4,600,000 R.B.C.; 7,000 W.B.C.; Kahn negative; pr. 115/68.

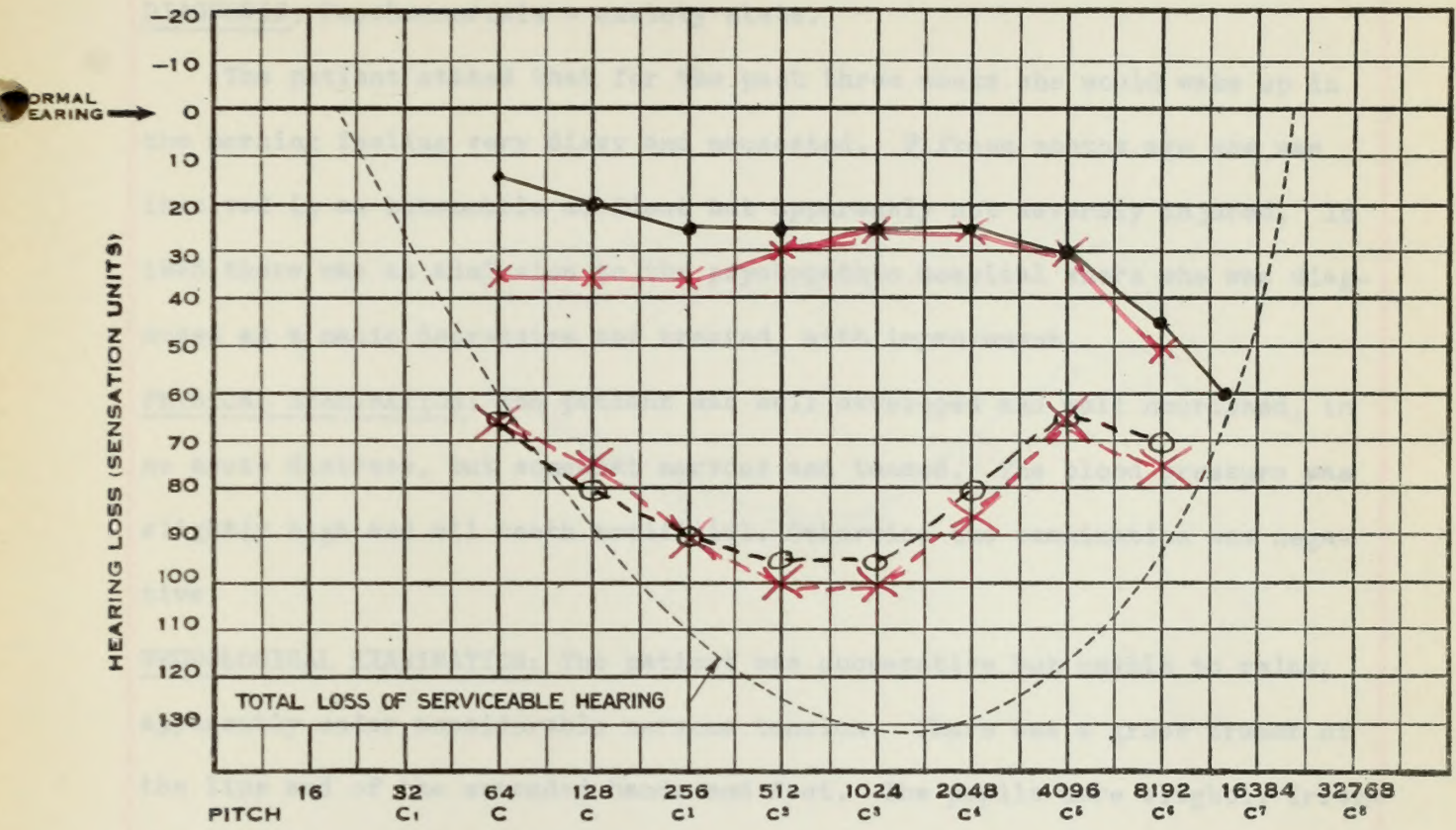
LUMBAR PUNCTURE: I.P. 100; 15 cc. removed; F.P. 50; appearance normal; 1 WBC; 0 polys; 0 R.B.C., Ross-Jones nor Pandy; protein 36 mg/100 cc.; gold sol 0011100000; Wasserman negative.

X-rays of skull showed the sella turcica bridging, sinuses and mastoids negative. Past diseases of interest are measles, mumps and pertussis.

EVANS MEMORIAL

AUDIOGRAM

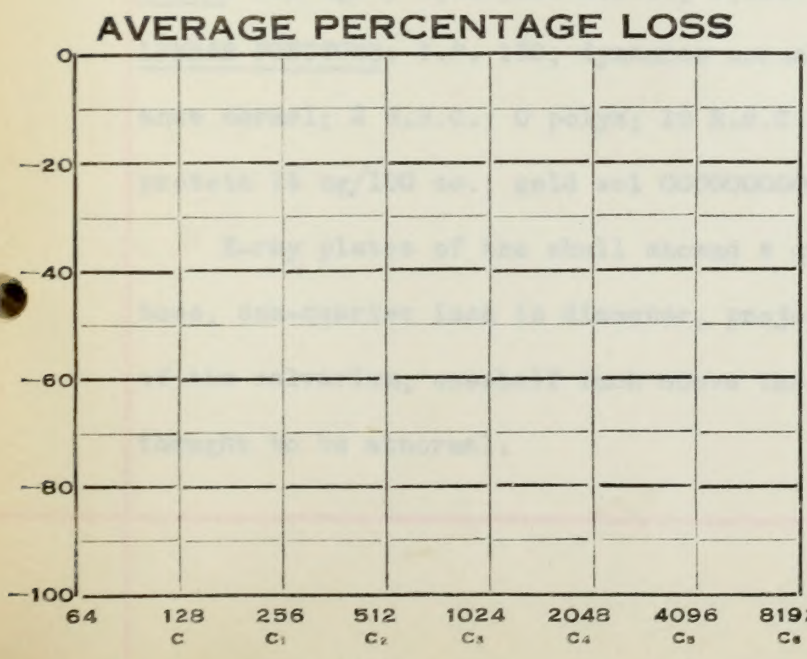
NAME C.C. 745221
DATE.....19.....



Percentage Hearing Loss

Right Ear

Left Ear



Weber Right at 4 Points

Disease

Duration

Chief Symptom.....

1. Deafness.....

2. Pain.....

3. Discharge.....

4. Tinnitus.....

5. Headache.....

6. Dizziness.....

Right.....Left.....

Rinne AC BC.....

Weber.....

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

EVANS MEMORIAL

C... C...; #745,221; Female; Age 37; White; Single.

DIAGNOSIS: Psychoneurosis - anxiety state.

The patient stated that for the past three weeks she would wake up in the morning feeling very dizzy and nauseated. Fifteen months ago she was involved in an automobile accident but apparently not severely injured. In 1925 there was an admission to the psychopathic hospital where she was diagnosed as a manic depressive and treated, with improvement.

PHYSICAL EXAMINATION: The patient was well developed and well nourished, in no acute distress, but somewhat nervous and tensed. The blood pressure was slightly high and all teeth artificial. Otherwise the examination was negative.

NEUROLOGICAL EXAMINATION: The patient was cooperative but unable to relax; apparently under considerable nervous tension. There was a gross tremor of the lips and of the extended hands and feet. The pupils were slightly irregular but the reaction to light and accommodation was normal. All the tendon reflexes were hyperactive, with no pathologic signs present.

URINE: Straw; cloudy; neutral; sp. gr. 1008; trace of albumen; no sugar; few epithelial cells in the sediment.

BLOOD: 80% Hgb.; 5,400,000 R.B.C.; 8,200 W.B.C.; Kahn negative; pr. 160/92.

LUMBAR PUNCTURE: I.P. 130; dynamics normal; 15 cc. removed; F.P. 100; appearance normal; 2 W.B.C.; 0 polys; 10 R.B.C.; no Ross-Jones nor Pandy reaction; protein 14 mg/100 cc.; gold sol 0000000000; Wasserman negative.

X-ray plates of the skull showed a questionable area of round, dense bone, one-quarter inch in diameter, projecting inward from the inner table of the calvarium, one-half inch above the right frontal sinus. This was not thought to be abnormal.

5... 5...; 5755.571; female; age 37; white; single.

Diagnosis: Psychomotoric - anxiety state.

The patient states that for the past three weeks she could sleep up to the morning feeling very tired and nervous. Within weeks she was involved in an automobile accident but apparently not severely injured. In 1937 there was an admission to the psychiatric hospital where she was diagnosed as a manic depressive and treated with lithium.

Physical Examination: The patient was well developed and well nourished, in no acute distress, but somewhat nervous and tense. The blood pressure was slightly high and all teeth artificial. Otherwise the examination was negative.

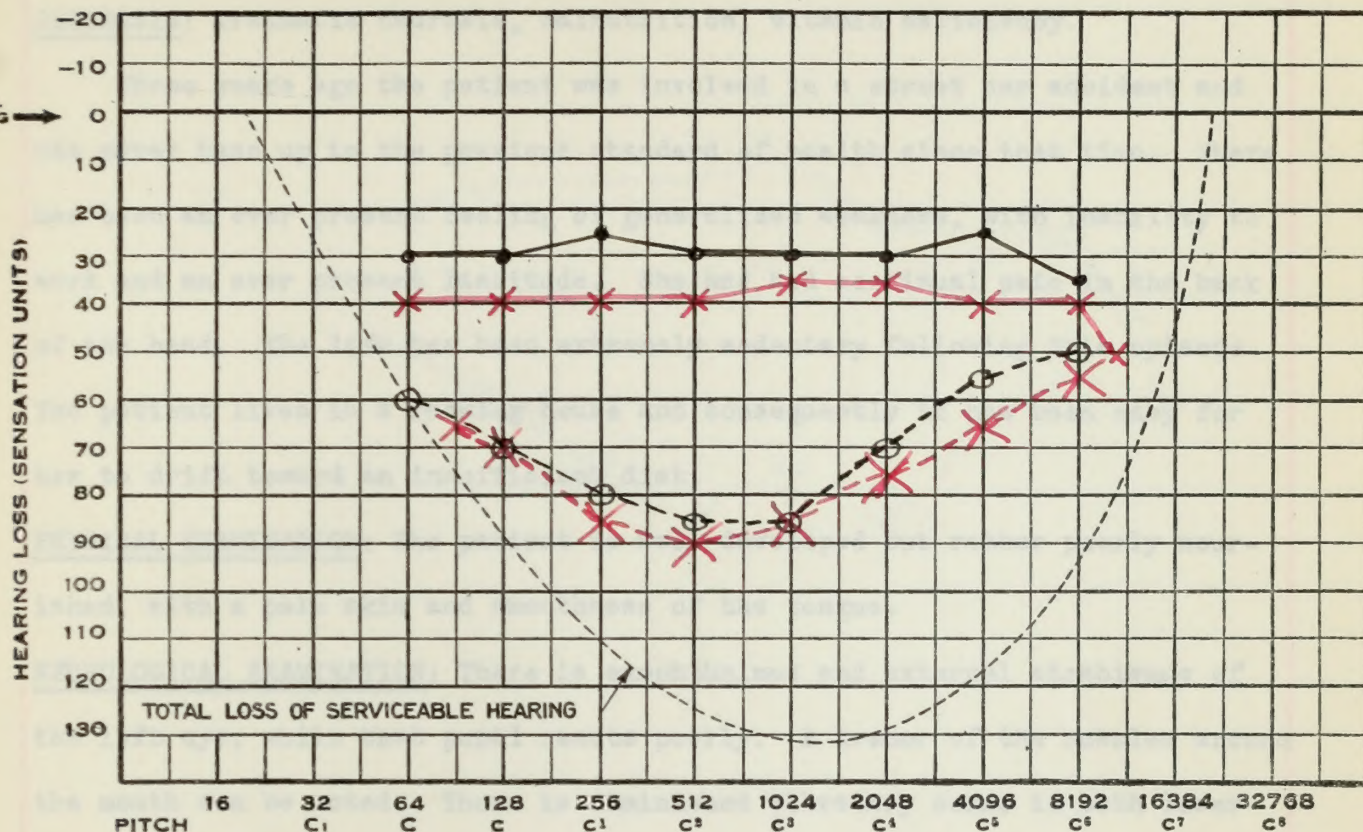
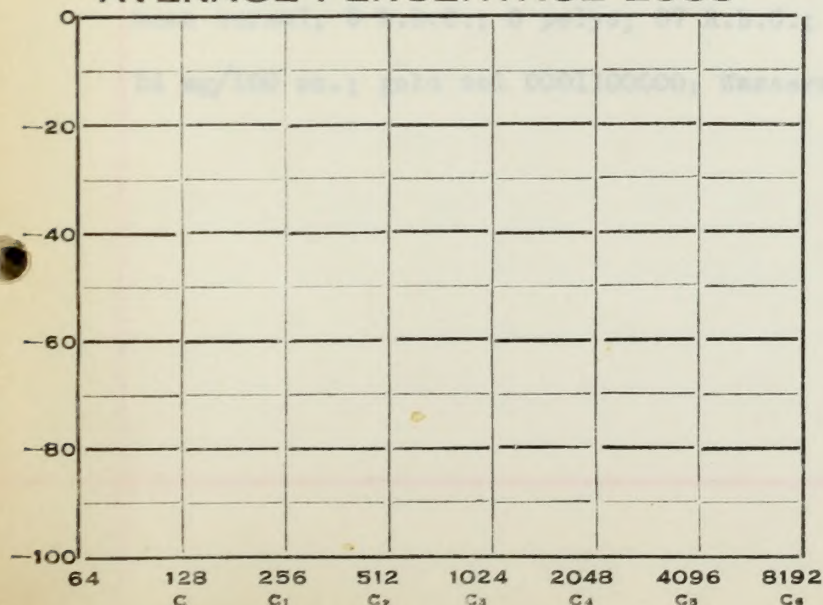
Neurological Examination: The patient was responsive but unable to relax; apparently under considerable nervous tension. There was a gross tremor of the lips and of the extended hands and feet. The pupils were slightly larger than but the reaction to light and accommodation was normal. All the tendon reflexes were hyperactive, with no pathologic signs present.

Urine: Straw; cloudy; neutral; sp. gr. 1.008; traces of albumin; no sugar; few epithelial cells in the sediment.

Blood: Hgb. 12.400; WBC 8,500; E.S.R. 5.5; Kahn negative; TT 100/32.

Lumbar Puncture: 1.5. 1.50; dynamics normal; 15 cc. removed; 7.7. 100; appearance normal; 5.7. 5.5; 0 cells; 10 E.S.R.; no Ross-Jones nor Pandy reaction; protein 15 mg/100 cc.; gold not DOODSON; Wassermann negative.

X-ray plates of the skull showed a questionable area of round, dense bone, one-quarter inch in diameter, projecting inward from the inner table of the calvarium, one-half inch above the right frontal sinus. This was not thought to be abnormal.

EVANS MEMORIAL**AUDIOGRAM**NAME N.C. 736, 775
DATE.....19.....**AVERAGE PERCENTAGE LOSS**

Weber Right at Vertex
= at { Forehead
Nose bridge
Chin

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

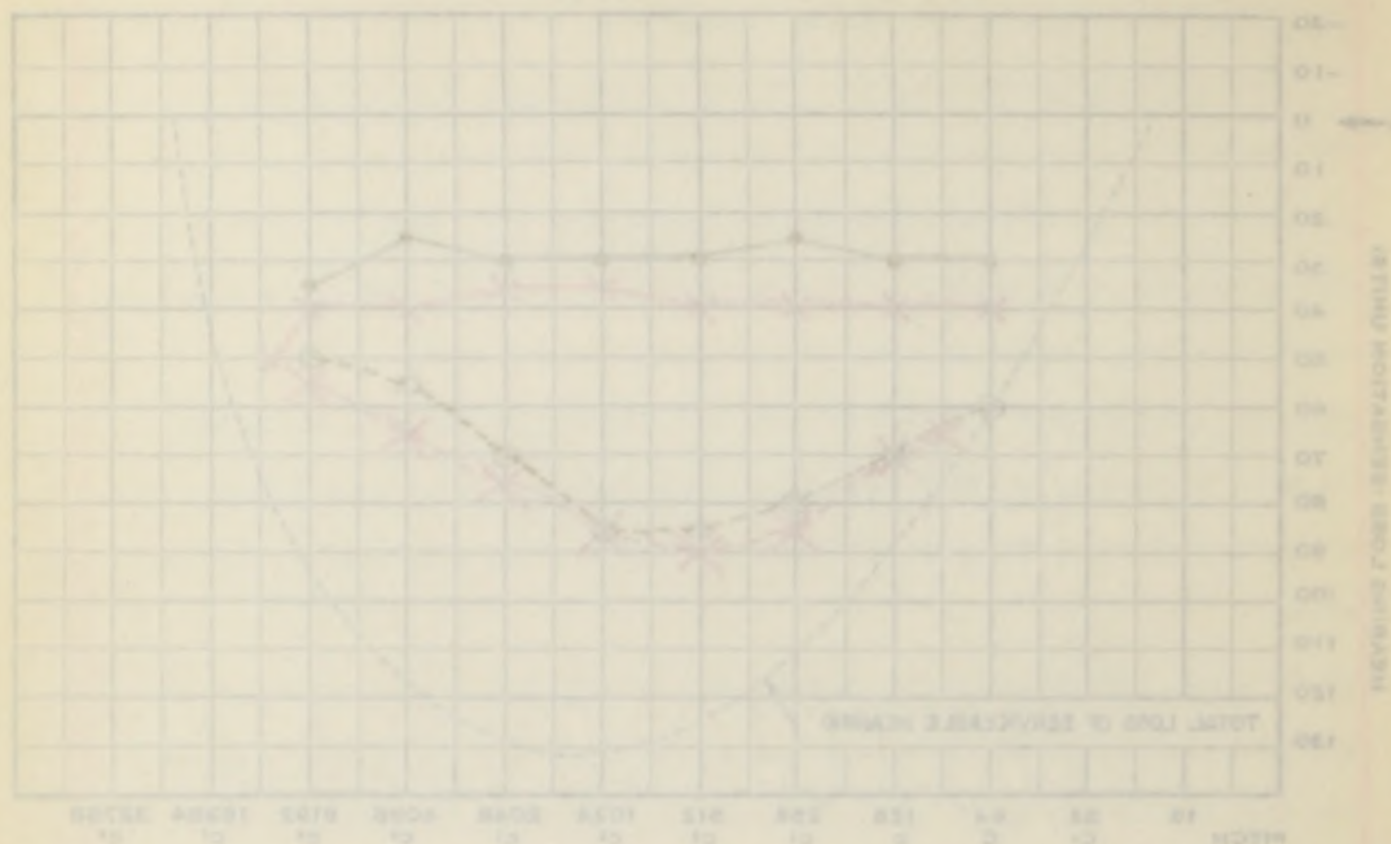
Voice.....

EVANS MEMORIAL

AUDIOGRAM

NAME
W.C.

DATE
7-26-77



EVANS MEMORIAL

N...C...; #736,775; Female; Age 50; White; Single.

DIAGNOSIS: Traumatic neurosis, malnutrition, vitamin deficiency.

Three years ago the patient was involved in a street car accident and has never been up to the previous standard of health since that time. There has been an ever present feeling of generalized weakness, with inability to work and an ever present lassitude. She has had continual pain in the back of the head. The life has been extremely sedentary following this episode. The patient lives in a rooming house and consequently it has been easy for her to drift toward an insufficient diet.

PHYSICAL EXAMINATION: The patient is well developed but rather poorly nourished, with a pale skin and smoothness of the tongue.

NEUROLOGICAL EXAMINATION: There is exophthalmos and external strabismus of the left eye, while that pupil reacts poorly. A tremor of the muscles around the mouth can be noted. There is diminished vibratory sense in both lower extremities.

URINE: Amber; alkaline; sp. gr. 1020; no sugar nor albumen.

BLOOD: 84% Hgb.; 4,050,000 R.B.C.; 4,800 W.B.C.; N.P.N. 22; B.S. 71; Kahn negative; pressure 115/65.

LUMBAR PUNCTURE: I.P. 110; dynamics normal; 15 cc. removed; F.P. 0; appearance normal; 3 W.B.C.; 0 polys; 87 R.B.C.; No Ross-Jones nor Pandy; protein 24 mg/100 cc.; gold sol 0001100000; Wasserman negative.

W.C.C.; 4738, 770; Female; Age 50; White; Stage 1.

DIAGNOSIS: Traumatic neuritis, unilateral, vitamin deficiency.

Three years ago the patient was involved in a street car accident and has never been up to the previous standard of health since that time. There has been an ever present feeling of generalized weakness, with inability to work and an ever present lassitude. She has had continual pain in the back of the head. The life has been extremely sad and lonely following this episode. The patient lives in a rooming house and consequently it has been very hard for her to drift toward an independent life.

PHYSICAL EXAMINATION: The patient is well developed but rather poorly nourished, with a pale skin and smoothness of the tongue.

NEUROLOGICAL EXAMINATION: There is atrophy and external atrophy of the left eye, while the right pupil reacts poorly. A tremor of the muscles around the mouth can be noted. There is diminished vibratory sense in both lower extremities.

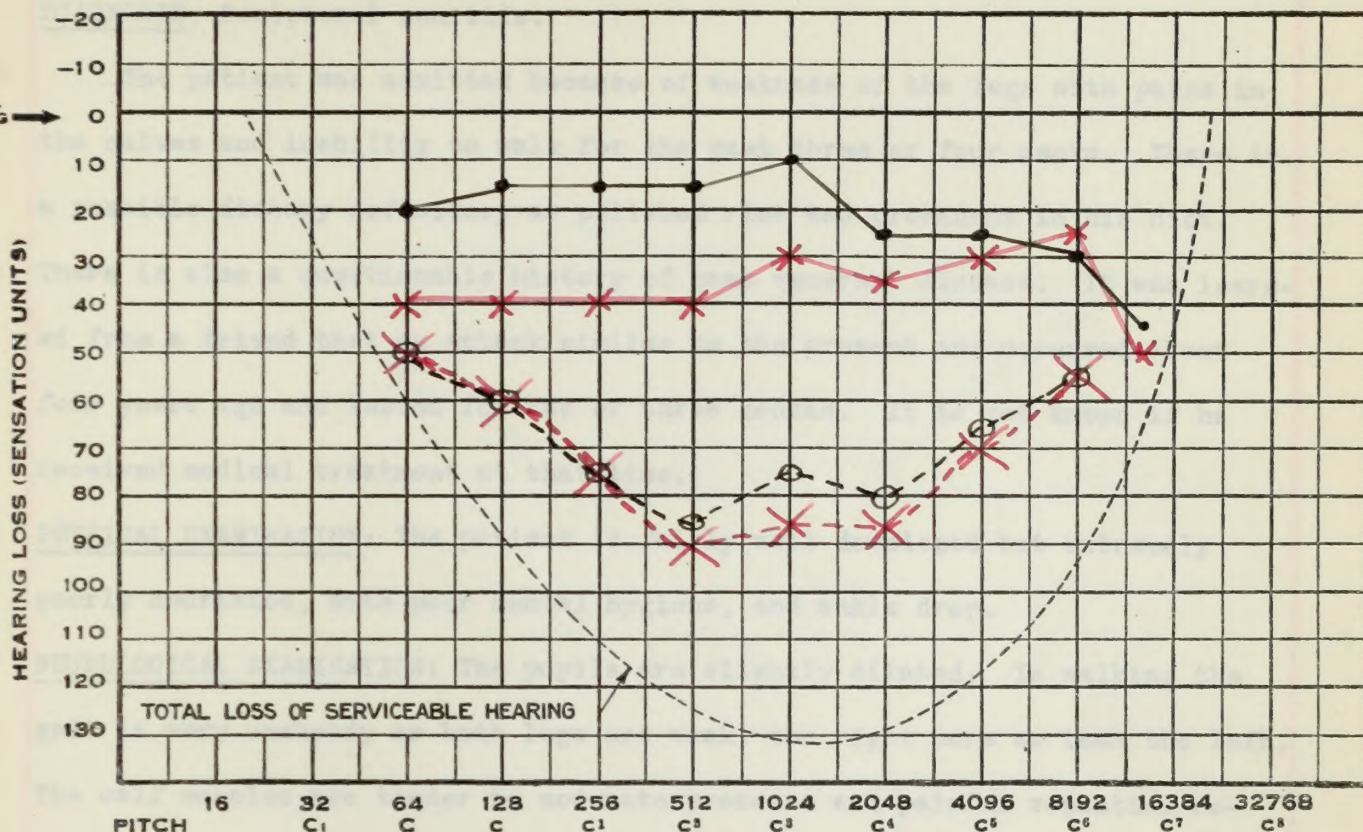
URINE: Acid; alkaline; sp. gr. 1.020; no sugar nor albumen.

BLOOD: Hgb. 4.050, 000 R.B.C.; 4,800 W.B.C.; W.P.N. 22; S.G. 71; Kahn

negative; pressure 115/85.

HUMAN FECTURE: I.P. 110; dynamics normal; 15 cc. removed; P.P. 0; appearance normal; 5 W.B.C.; 0 polys; 87 R.B.C.; No Ross-Jones nor Parhy; protein

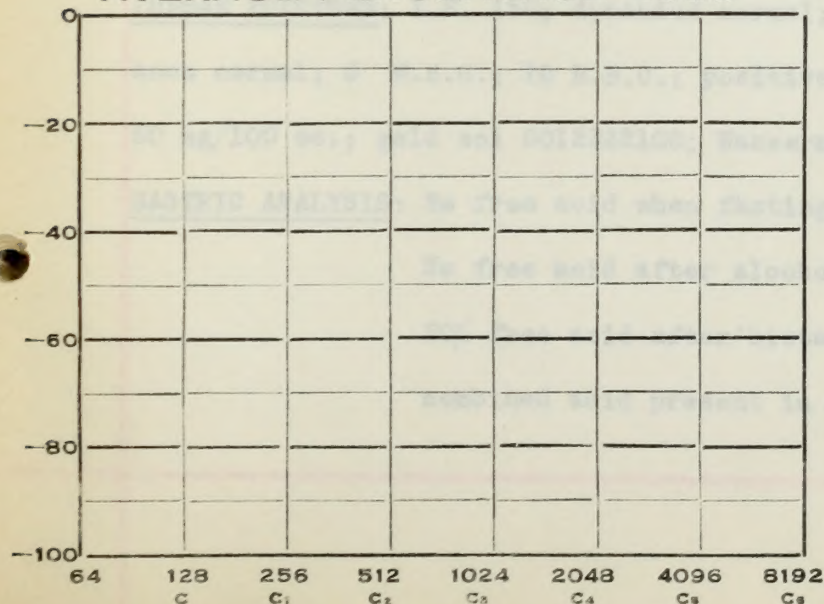
24 mg/100 cc.; Gold and COO110000; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**NAME C.H. 707319
DATE _____ 19__

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber = at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit

Lower Limit

Whisper

Voice

C...H...; #707,319; Male; Age 29; Yellow; Married.

DIAGNOSIS: Peripheral neuritis.

The patient was admitted because of weakness of the legs with pains in the calves and inability to walk for the past three or four weeks. There is a possible dietary deficiency as polished rice was prominent in his diet. There is also a questionable history of past venereal disease. It was learned from a friend that an attack similar to the present one occurred about four years ago and lasted for two or three months. It is not known if he received medical treatment at that time.

PHYSICAL EXAMINATION: The patient is fairly well developed but extremely poorly nourished, with poor dental hygiene, and ankle drop.

NEUROLOGICAL EXAMINATION: The pupils are slightly dilated. In walking the gait is very unsteady as both legs are weak, the right more so than the left. The calf muscles are tender to moderate pressure and painful sensation reactions are impaired. The upper extremities are hyperreflexive but knee and ankle jerks are absent, with impaired vibration sense below the knees. The cremasterics are diminished.

URINE: Straw; acid; sp. gr. 1024; no sugar nor albumen.

BLOOD: 7,150 W.B.C.; Kahn negative; pressure 110/60.

LUMBAR PUNCTURE: I.P. 150; dynamics normal; 12 cc. removed; F.P. 70; appearance normal; 0 W.B.C.; 10 R.B.C.; positive Ross-Jones and Pandy; protein 50 mg/100 cc.; gold sol 0012332100; Wasserman negative.

GASTRIC ANALYSIS: No free acid when fasting;

No free acid after alcohol;

30% free acid after histamine;

combined acid present in all cases.

C...H...: 4707, 212; male; age 28; yellow; married.

DIAGNOSIS: Peripheral neuritis.

The patient was admitted because of weakness of the legs with pains in the calves and inability to walk for the past three or four weeks. There is a possible dietary deficiency as evidenced by his diet. There is also a questionable history of past venereal disease. It was learned from a friend that an attack similar to the present one occurred about four years ago and lasted for two or three months. It is not known if he received medical treatment at that time.

PHYSICAL EXAMINATION: The patient is fairly well developed but extremely

poorly nourished, with poor dental hygiene, and ankle drop.

NEUROLOGICAL EXAMINATION: The pupils are slightly dilated. In walking the

gait is very unsteady as both legs are weak, the right more so than the left.

The calf muscles are tender to moderate pressure and painful sensation re-

sponses are impaired. The upper extremities are hyperreflexic but knee and

ankle jerks are absent, with increased vibration sense below the knees. The

reflexes are diminished.

URINE: Straw; acid; sp. gr. 1.024; no sugar nor albumen.

BLOOD: 7.150 H.C.; Kahn negative; hematocrit 110/60.

SPINAL FLUID: I.P. 150; dynamics normal; 12 cc. removed; R.P. 70; appear-

ance normal; 0.8 H.C.; 10 H.B.C.; positive Wasserman and Pandy; protein

50 mg/100 cc.; gold and CO1325100; Wasserman negative.

HAZARD ANALYSIS: No free acid when fasting;

No free acid after alcohol;

300 free acid after histamine;

combined acid present in all cases.

EVANS MEMORIAL

AUDIOGRAM

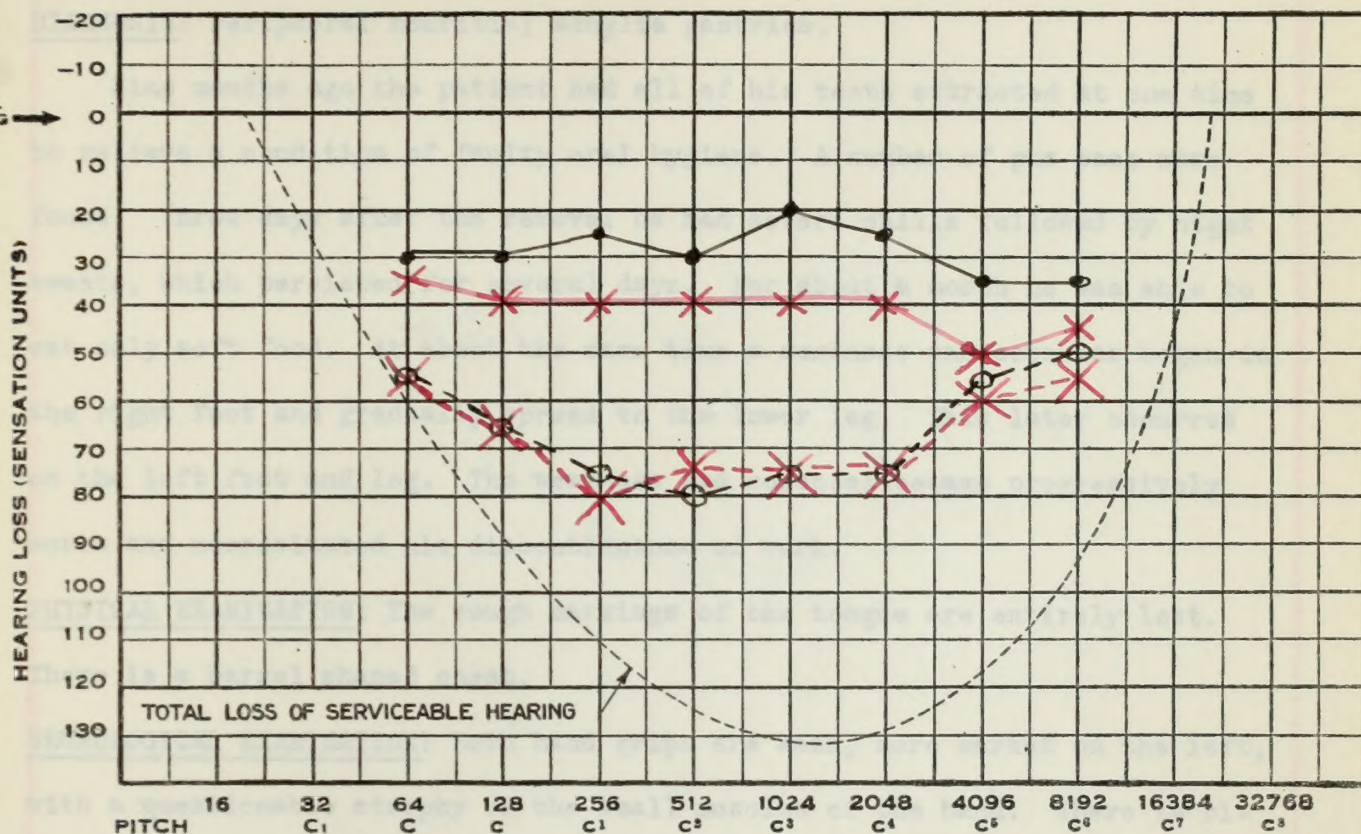
NAME

J. M.

720244

DATE

19

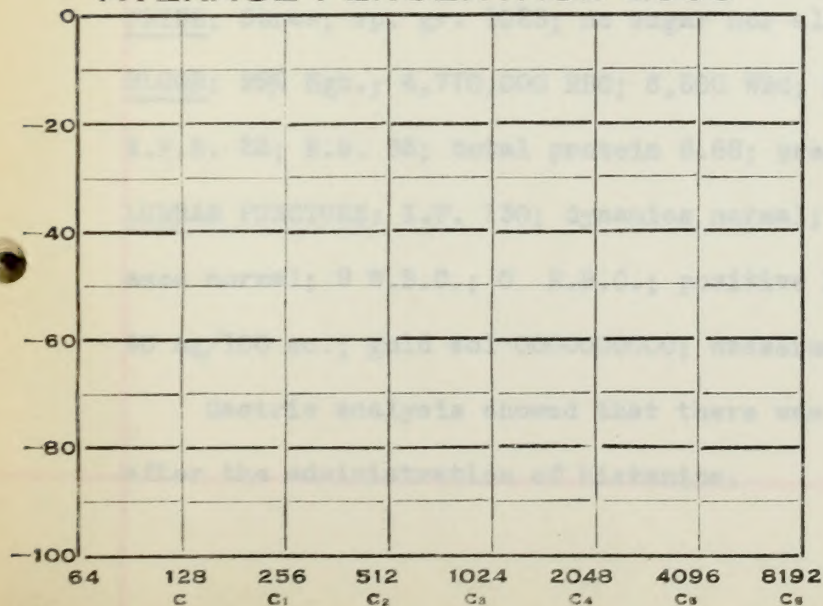


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber = at 4 Points

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right

Left

Rinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

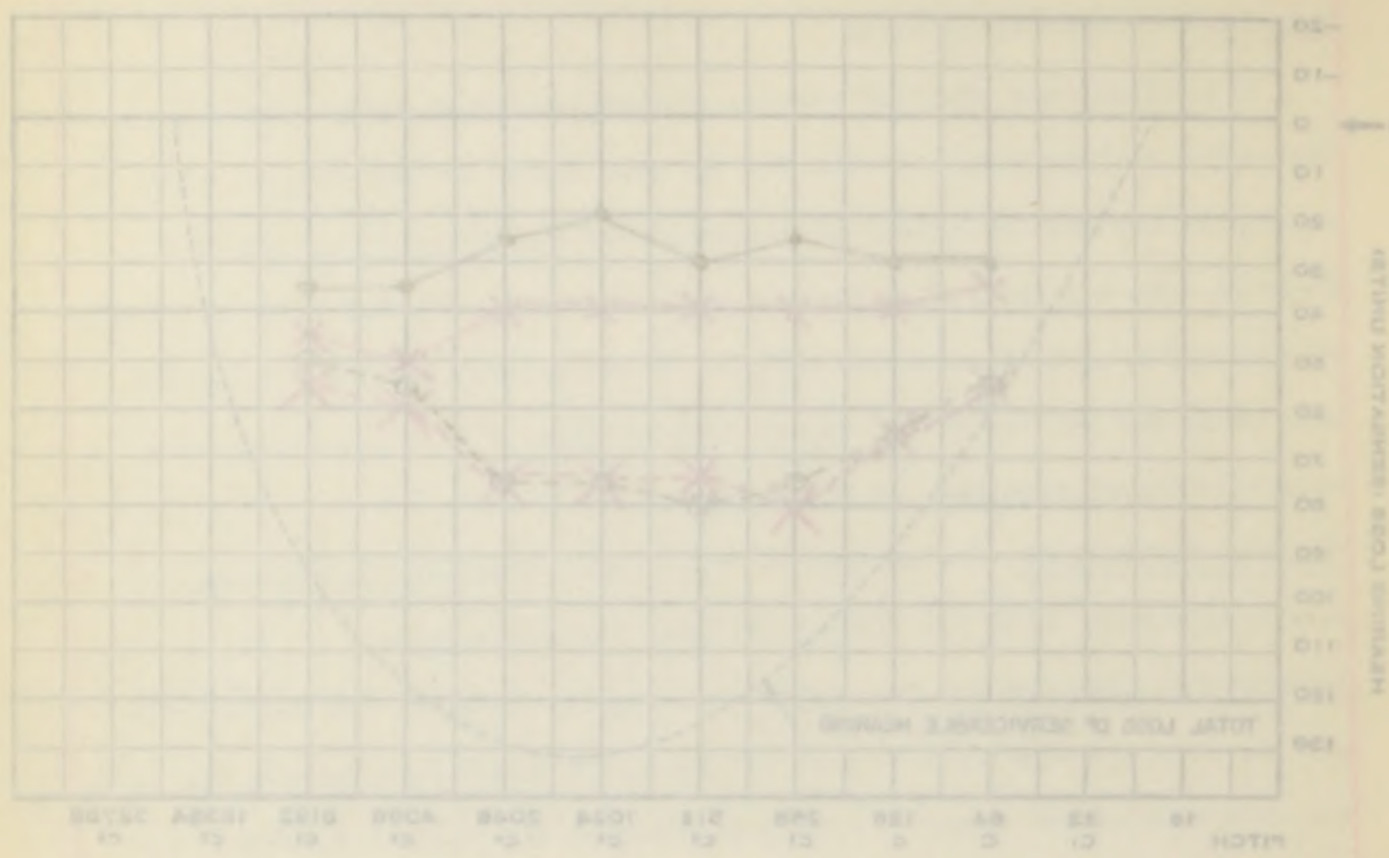
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

J.M.

720 244
12



EVANS MEMORIAL

J... M...; #720,244; Male; Age 54; White; Married.

DIAGNOSIS: Peripheral neuritis; achylia gastrica.

Nine months ago the patient had all of his teeth extracted at one time to relieve a condition of faulty oral hygiene. A number of pus sacs were found. Three days after the removal he had severe chills followed by night sweats, which persisted for several days. For about a month he was able to eat only soft food. At about the same time a numbness and soreness began in the right foot and gradually spread to the lower leg. This later occurred on the left foot and leg. The weakness and soreness became progressively worse and necessitated his discontinuance of work.

PHYSICAL EXAMINATION: The rough markings of the tongue are entirely lost. There is a barrel shaped chest.

NEUROLOGICAL EXAMINATION: Both hand grips are weak, more marked on the left, with a questionable atrophy of the small muscles of the hand. There is bilateral intention tremor and hyperactive reflexes of the arms. Both ankle and knee jerks are absent, with diminished pain sense, impaired vibration sense of both lower legs, and loss of position sense in the toes. There is ataxia on heel to shin test and weakness of both legs to all motions. The legs and feet are cold and sweating.

URINE: Straw; sp. gr. 1025; no sugar nor albumen.

BLOOD: 95% Hgb.; 4,770,000 RBC; 6,500 WBC; Kahn negative; calcium 11.2;

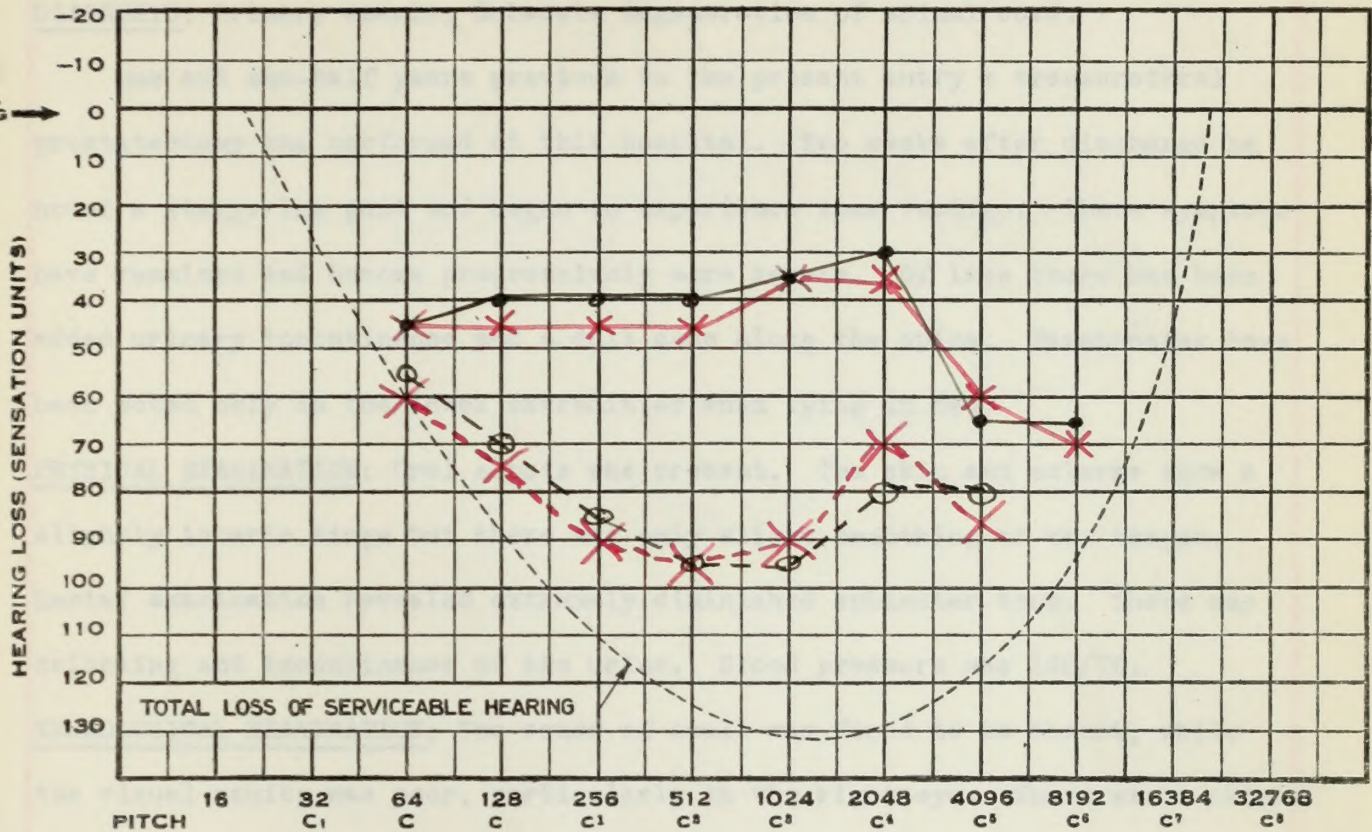
N.P.N. 28; B.S. 85; total protein 5.68; pressure 105/65.

LUMBAR PUNCTURE: I.P. 130; dynamics normal; 10 cc. removed; F.P. 60; appearance normal; 9 W.B.C.; 0 R.B.C.; positive Ross-Jones and Pandy; protein 40 mg/100 cc.; gold sol 0000000000; Wasserman negative.

Gastric analysis showed that there was no free hydrochloric acid even after the administration of histamine.

EVANS MEMORIAL

AUDIOGRAM

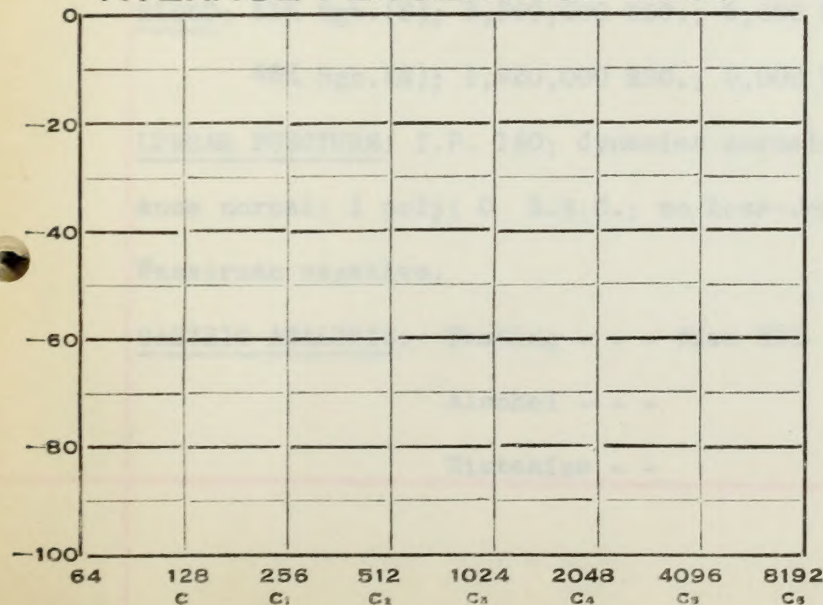
NAME T. K. 734879
DATE _____ 19__

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber = at 4 Points

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

Right

Left

..... Rinne AC

..... BC

..... Weber

..... Upper Limit.....

..... Lower Limit.....

..... Whisper.....

..... Voice.....

T... P... K...; #734,879; White; Age 63; Male; Married.

DIAGNOSIS: Primary anemia; Subacute degeneration of spinal cord.

One and one-half years previous to the present entry a transurethral prostatectomy was performed at this hospital. Two weeks after discharge he noted a staggering gait and began to experience some vertigo. These symptoms have remained and become progressively more severe. Of late there has been added urinary incontinence and a dull ache along the spine. Parathesias have been noted only in the lower extremities when lying in bed.

PHYSICAL EXAMINATION: Oral sepsis was present. The skin and sclerae show a slightly icteric tinge but there was only slight smoothing of the tongue. Rectal examination revealed extremely diminished sphincter tone. There was dribbling and incontinence of the urine. Blood pressure was 140/76.

NEUROLOGICAL EXAMINATION: The sense of smell was found to be absent, while the visual acuity was poor, particularly in the right eye. There was a slight intention tremor and instability in the heel to shin test. The gait was rolling and unsteady. The reflexes of the upper extremities were hyperactive, the abdominals absent and those of the lower extremities normal.

URINE: Yellow; acid; sp. gr. 1016; no sugar but a trace of albumen; a few W.B.C. and 15 to 25 R.B.C. in the sediment.

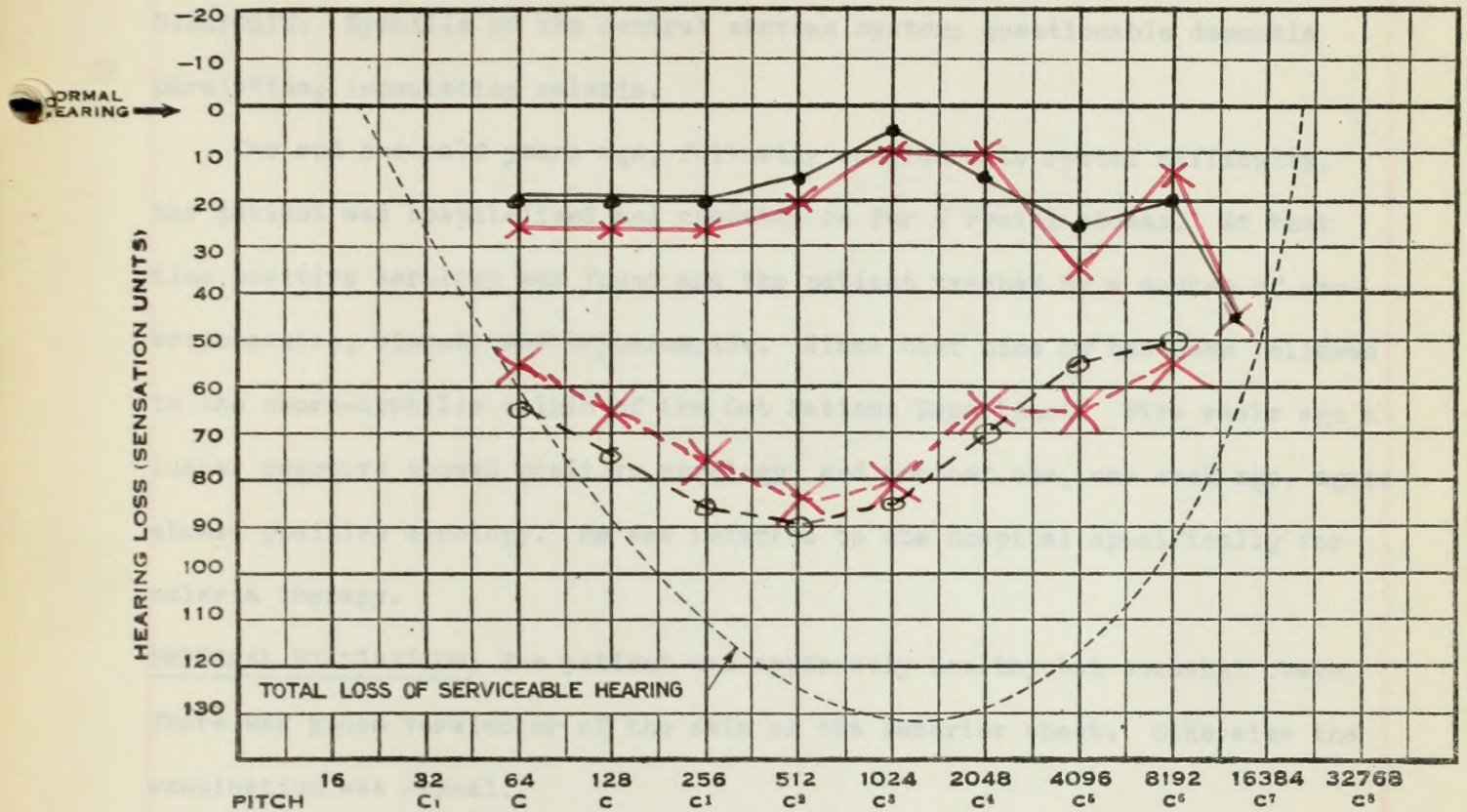
BLOOD: 51% Hgb.(S); 2,300,000 RBC.; 5,600 WBC.; C.I. 1.1; Kahn negative;
48% Hgb.(S); 1,920,000 RBC.; 5,000 WBC.; C.I. 1.3; (following day).

LUMBAR PUNCTURE: I.P. 160; dynamics normal; 15 cc. removed; F.P. 80; appearance normal; 1 poly; 0 R.B.C.; no Ross-Jones nor Pandy; gold sol 0000000000; Wasserman negative.

<u>GASTRIC ANALYSIS</u> :	Fasting - - - free HCl	0.0	total HCl	0.3
	Alcohol - - -	0.0		0.1
	Histamine - -	0.0		0.2

EVANS MEMORIAL

AUDIOGRAM

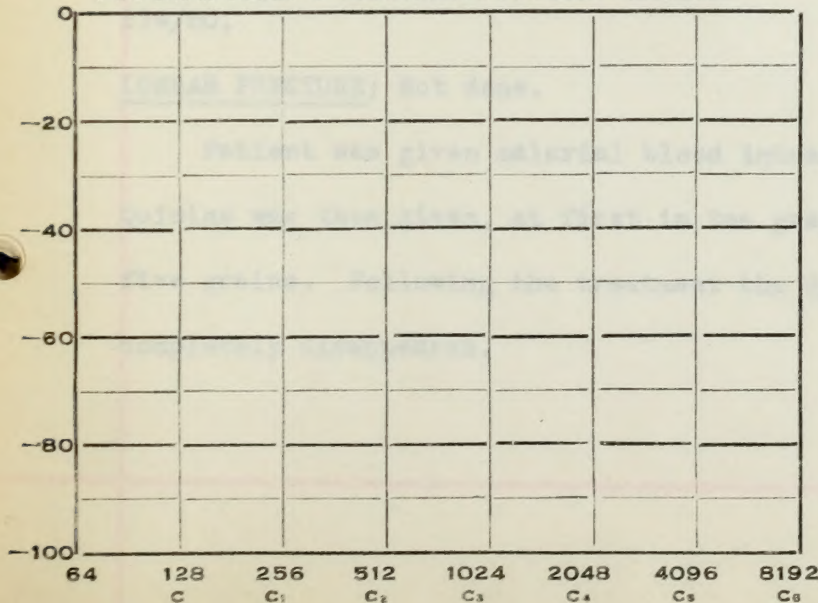
NAME L. D. 741606
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber Right at {Vertex
Forehead
= at {Nose bridge
Chin

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

..... Rinne AC

..... BC

..... Weber

..... Upper Limit

..... Lower Limit

..... Whisper

..... Voice

EVANS MEMORIAL

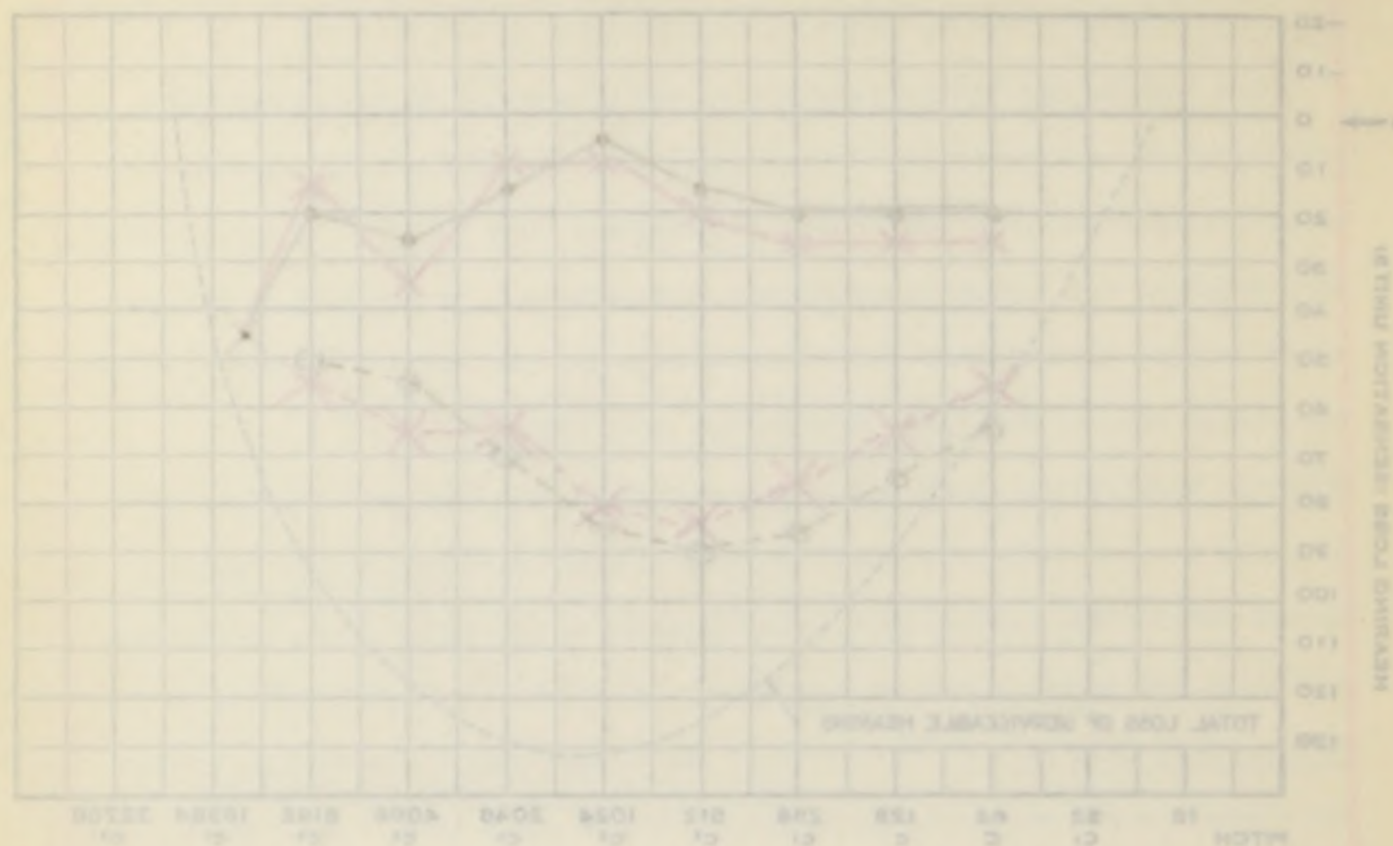
741606

L. D.

NAME

DATE

AUDIOGRAM



L... D...; #741,606; Male; Age 33; White; Single.

DIAGNOSIS: Syphilis of the central nervous system; questionable dementia paralytica; inoculation malaria.

Two and one-half years ago, following considerable rectal difficulty, the patient was hospitalized and operated on for a rectal abscess. At that time positive serology was found and the patient treated by a course of neoarsphenamine, bismuth and tryparsamide. Since that time he has been followed in the neuro-syphilis clinic of the Out Patient Department. Five weeks ago a lumbar puncture showed positive serology, and another one, one week ago, again showed positive serology. He was referred to the hospital specifically for malaria therapy.

PHYSICAL EXAMINATION: The patient was apparently healthy but somewhat obese. There was ~~pin~~ea versicolor of the skin of the anterior chest. Otherwise the examination was normal.

NEUROLOGICAL EXAMINATION: There was slight blurring of the nasal margins of the discs and a slight nystagmus on lateral deviation. There was a slight dysarthria when test phrases were repeated. The gag reflex was absent.

URINE: Amber; cloudy; acid; sp. gr. 1018; no sugar nor albumen.

BLOOD: 100% Hgb.; 5,000,000 R.B.C.; 7,000 W.B.C.; Kahn negative; pressure 114/80.

LUMBAR PUNCTURE: Not done.

Patient was given malarial blood intravenously, followed by ten chills. Quinine was then given, at first in ten grain quantities, then reduced to five grains. Following the treatment the dysarthria present on admission had completely disappeared.

... D...; 5'4 1/2, 130; hair; Age 33; White; Single.

DIAGNOSIS: Syphilis of the central nervous system; questionable dementia

paralytic; inoculation neuritis.

Two and one-half years ago, following considerable mental difficulty,

the patient was hospitalized and operated on for a vesical stricture. At that

time positive serology was found and the patient treated by a course of neo-

arsphenamine, biarsenic and trypanblue. Since that time he has been followed

in the neuro-syphilis clinic of the Out Patient Department. Five weeks ago a

lumbar puncture showed positive serology, and another day, one week ago, again

showed positive serology. He was referred to the hospital specifically for

neuritis therapy.

PHYSICAL EXAMINATION: The patient was apparently healthy but somewhat obese.

There was slight vesication of the skin of the anterior chest. Otherwise the

examination was normal.

NEUROLOGICAL EXAMINATION: There was slight clonus of the nasal margin of

the discs and a slight nystagmus on lateral deviation. There was a slight

spasticity when test phrases were repeated. The gag reflex was absent.

URINE: Acid; cloudy; acid; sp. gr. 1.018; no sugar nor albumen.

BLOOD: 1000 RBC.; 5,000,000 W.B.C.; 7,000 W.B.C.; Kahn negative; pressure

104/80.

LUMBAR PUNCTURE: Not done.

Patient was given malarial blood intravenously, followed by ten millie.

of sodium was then given, at first in ten grain quantities, then reduced to

five grains. Following the treatment the spasticity present on admission had

completely disappeared.

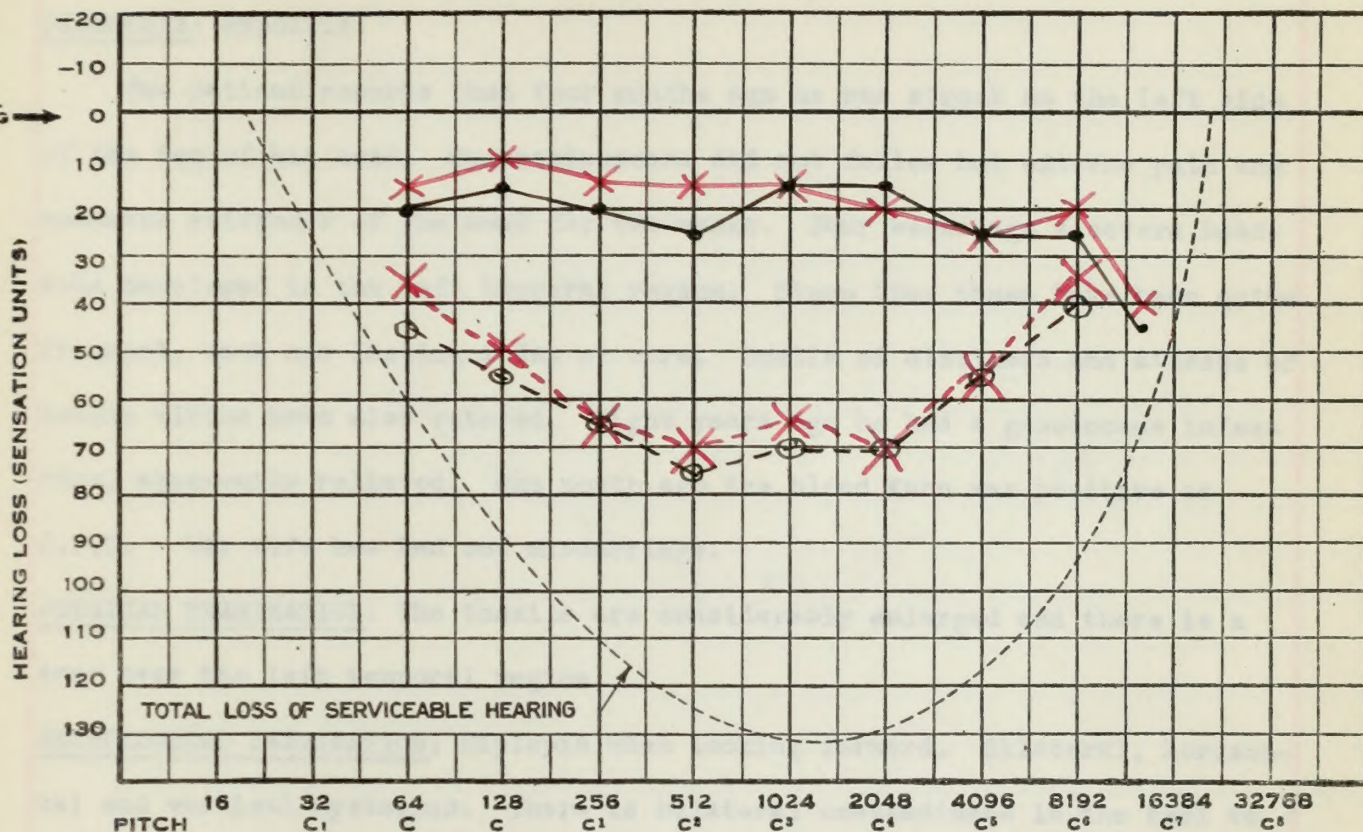
EVANS MEMORIAL**AUDIOGRAM**

NAME

*J. F.**728098*

DATE

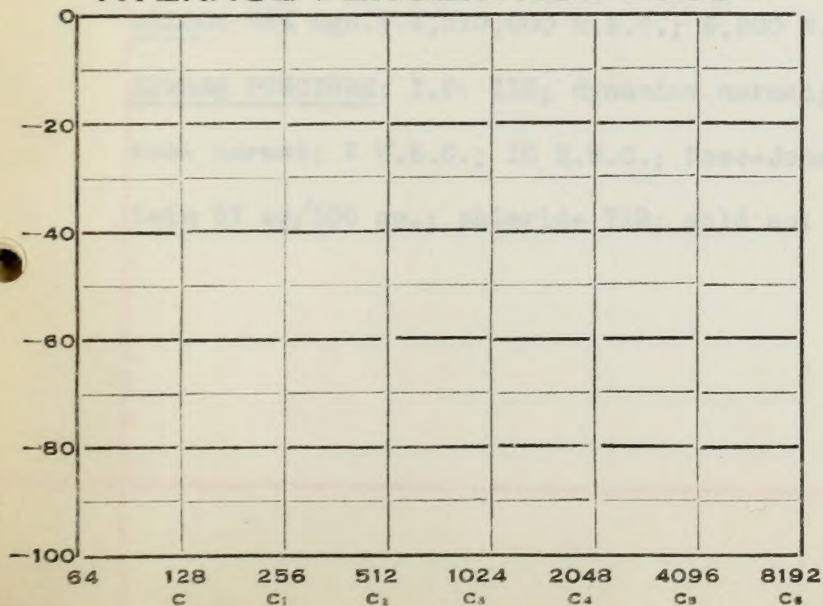
19



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber Right at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

Rinne AC

Weber

Upper Limit

Lower Limit

Whisper

Voice

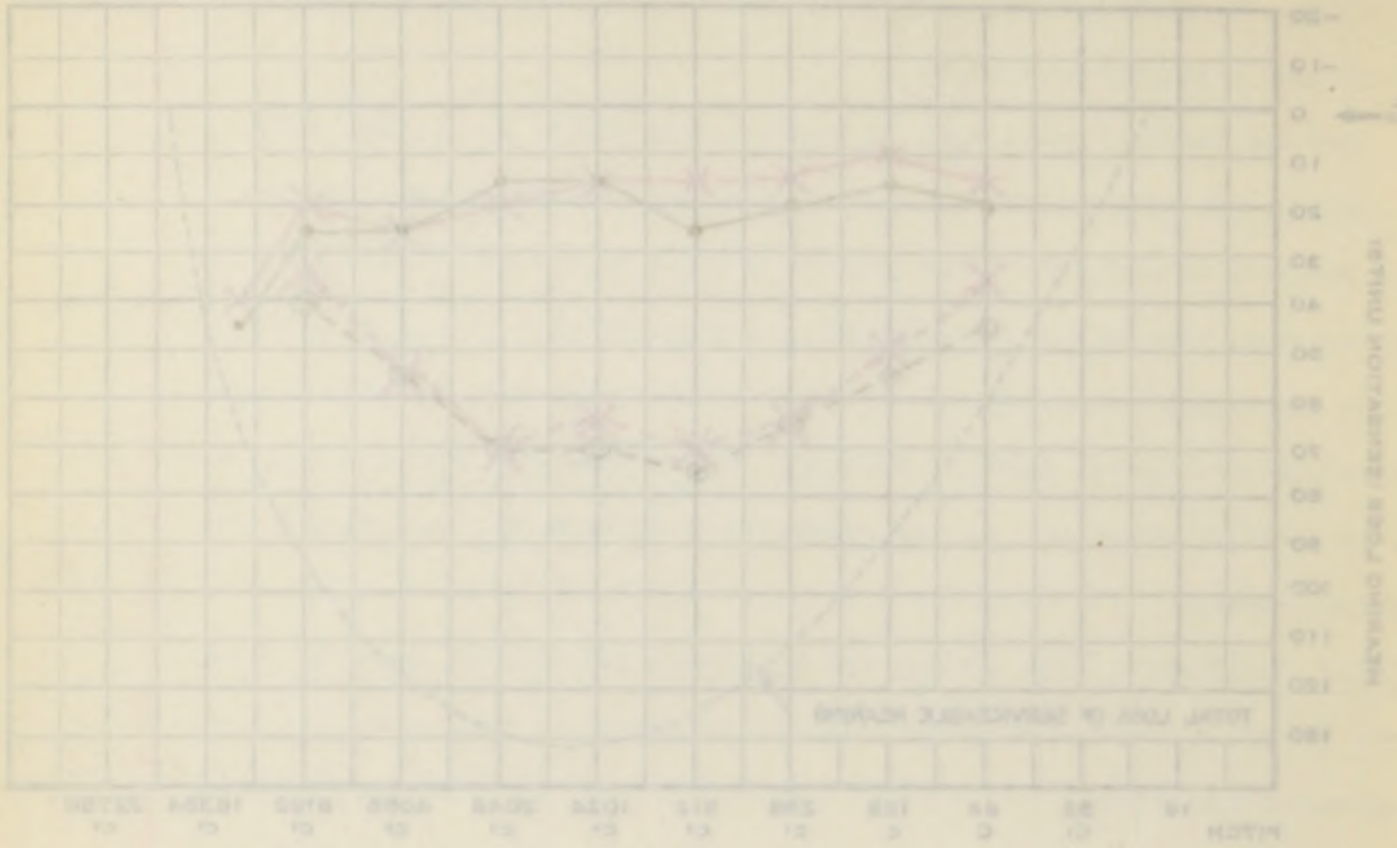
ETVANS MEMORIAL

222097

J. F.

NAME
DATE

AUDIOGRAM



J... F...; #728,098; Male; Age 28; Colored; Married.

DIAGNOSIS: Syphilis.

The patient reports that four months ago he was struck on the left side of the top of his head. Unconsciousness did not follow but extreme pain and moderate stiffness of the neck for two weeks. Four weeks ago a severe headache developed in the left temporal region. Since then these have been quite frequent, each one lasting a day or more. Spells of dizziness and attacks of double vision have also entered. Eight years ago he had a gonococcus infection, apparently relieved. One month ago the blood Kahn was positive at O.P.D. His wife has had one miscarriage.

PHYSICAL EXAMINATION: The tonsils are considerably enlarged and there is a scar over the left temporal region.

NEUROLOGICAL EXAMINATION: Diplopia when looking forward. Bilateral, horizontal and vertical nystagmus. There is bilateral unsteadiness in the heel to shin test. The gait is unsteady and the Romberg suggestively positive.

X-ray of the skull shows a linear shadow in the left temporal region consistent with fracture.

URINE: Amber; acid; sp. gr. 1018; no sugar nor albumen; epithelial cells in the sediment.

BLOOD: 98% Hgb.; 4,810,000 R.B.C.; 6,200 W.B.C.; Kahn positive; pr. 114/64.

LUMBAR PUNCTURE: I.P. 115; dynamics normal; 15 cc. removed; F.P. 60; appearance normal; 2 W.B.C.; 10 R.B.C.; Ross-Jones negative; Pandy positive; protein 37 mg/100 cc.; chloride 712; gold sol 0000000000; Wasserman negative.

4... 5...; 4/25/08; Male; Age 28; Colored; Married.

DIAGNOSIS: Syphilis.

The patient reports that four months ago he was struck on the left side of the top of his head. Unconsciousness did not follow but extreme pain and moderate stiffness of the neck for two weeks. Four weeks ago a severe headache developed in the left temporal region. Since then there have been quite frequent, each one lasting a day or more. Spells of dizziness and attacks of double vision have also occurred. Eight years ago he had a venereal infection, apparently untreated. Two months ago the blood Kahn was positive at

0.5.0. His wife has had one miscarriage.

PHYSICAL EXAMINATION: The tonsils are considerably enlarged and there is a

scar over the left temporal region.

NEUROLOGICAL EXAMINATION: Diplopia when looking forward. Blurred, horizon-

tal and vertical nystagmus. There is bilateral weakness in the hand to

skin test. The gait is unsteady and the Romberg suggestively positive.

X-ray of the skull shows a linear shadow in the left temporal region con-

sistent with fracture.

URINE: Acidic; white; sp. gr. 1018; no sugar nor albumen; epithelial cells in

the sediment.

BLOOD: Hgb. 4,810,000; R.B.C. 8,200; W.B.C. Kahn positive; pr. 114/68.

FUNCTIONAL TESTS: I.R. 118; glycemia normal; 18 cc. removed; R.T. 80; appear-

ance normal; 2 cc. R.B.C. 10 R.B.C.; Ross-Jones negative; Tandy positive; pro-

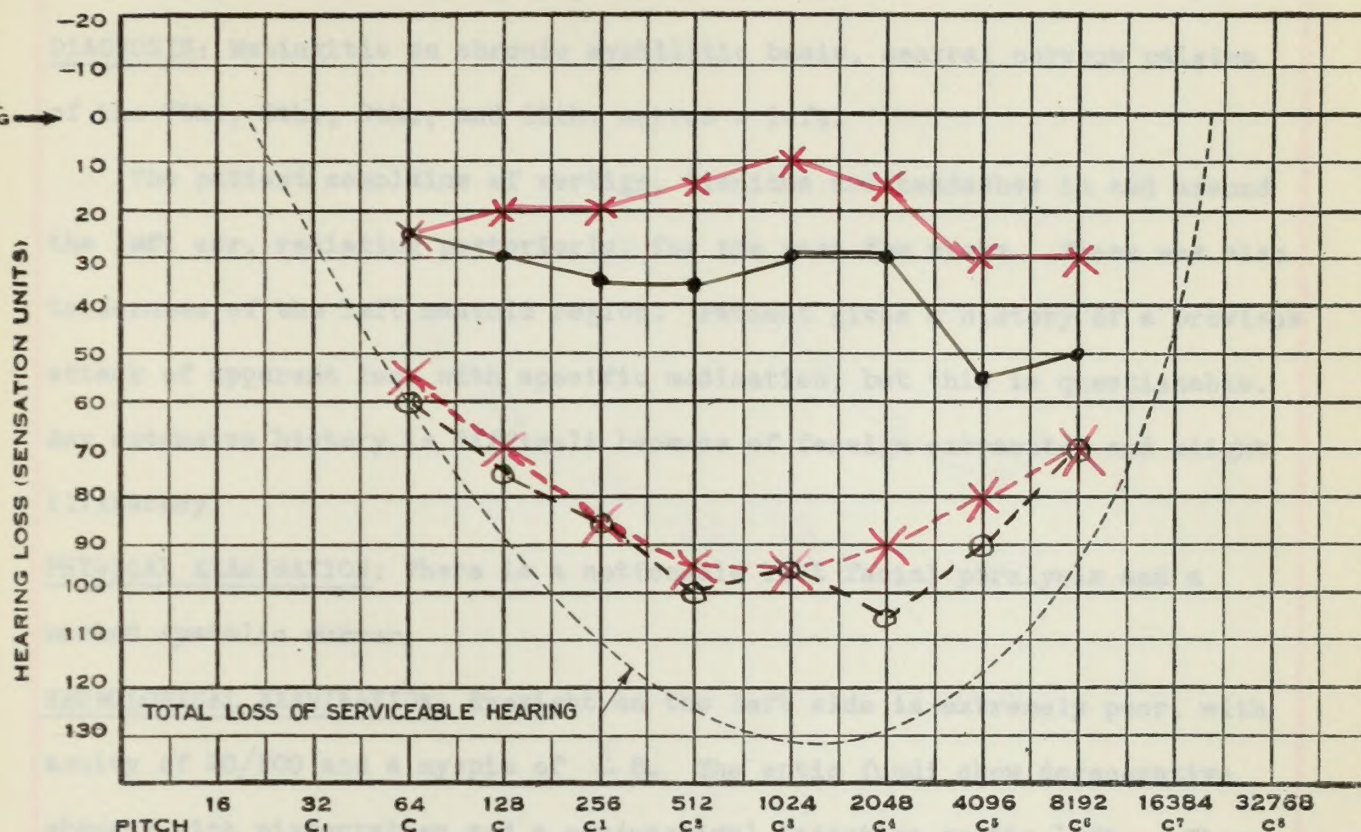
tein 27 mg/100 cc.; chloride 112; gold sol 000000000; Wassermann negative.

EVANS MEMORIAL

AUDIOGRAM

NAME S.P. 691569

DATE..... 19.....

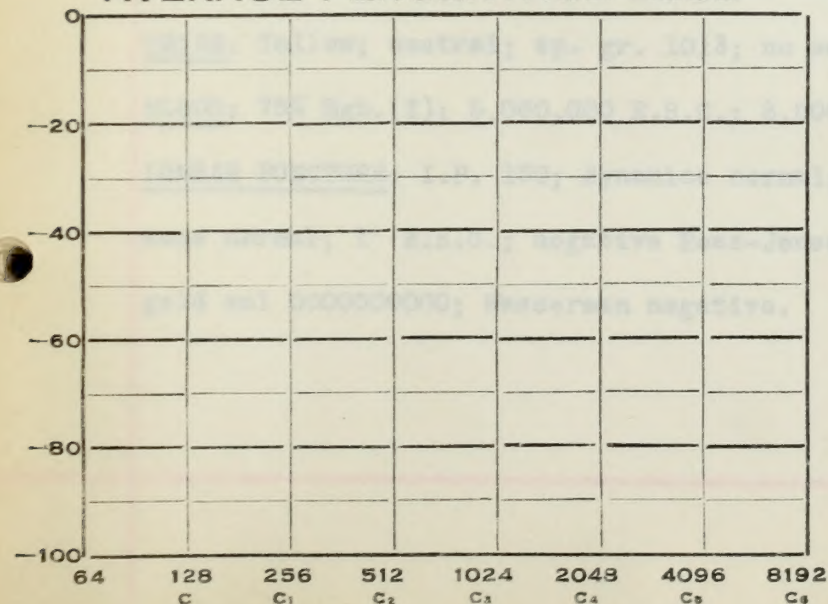


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber Right at 4 Points

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right

Left

Rinne $\frac{AC}{BC}$

Weber

Upper Limit

Lower Limit

Whisper

Voice

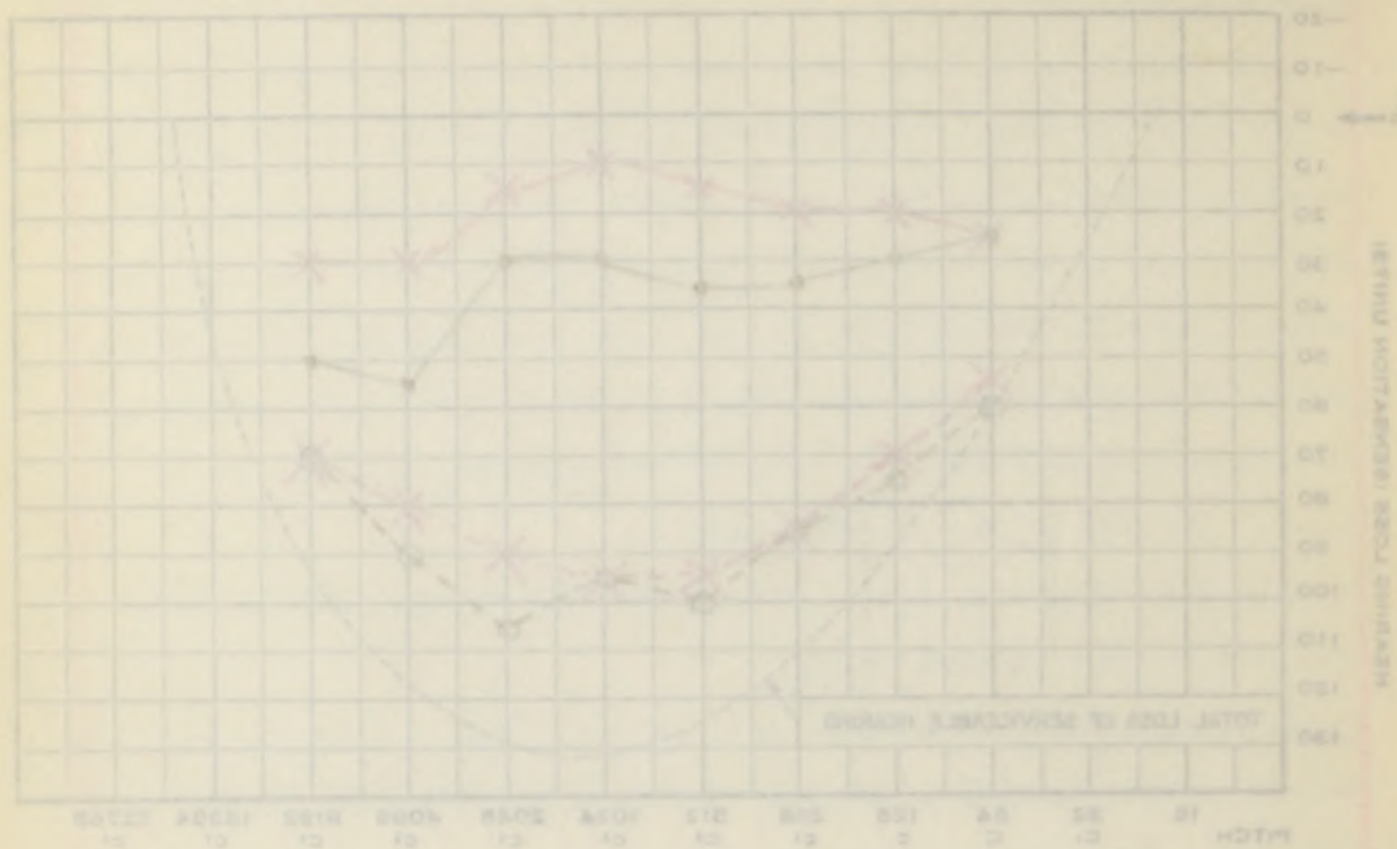
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

217

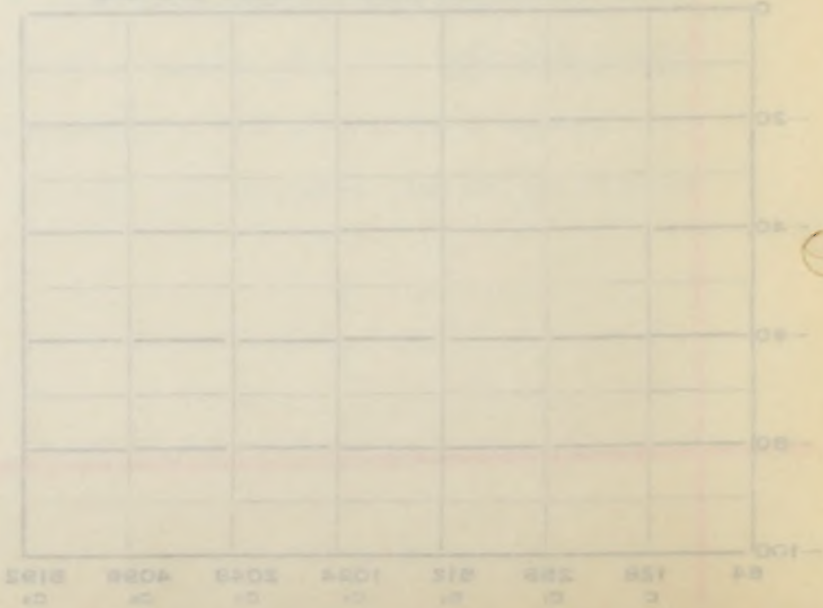
65104



Frequency Hearing Loss
Right Ear
Left Ear

Weber Right at 4 points

AVERAGE PERCENTAGE LOSS



- 1. Distance
- 2. Time
- 3. Frequency
- 4. Intensity
- 5. Duration
- 6. Direction

Left

Right
Knee
Wrist
Upper Arm
Lower Arm
Upper
Voice

S...P...; #691,569; Male; Age 32; White; Married.

DIAGNOSIS: Meningitis on chronic syphilitic basis, central nervous palsies of the 7th., 8th., 9th., and 10th. nerves - left.

The patient complains of vertigo, tinnitus and headaches in and around the left ear, radiating posteriorly, for the past few weeks. There was also tenderness of the left mastoid region. Patient gives a history of a previous attack of apparent lues with specific medication, but this is questionable. Any extensive history is difficult because of foreign extraction and slight illiteracy.

PHYSICAL EXAMINATION: There is a noticeable left facial paralysis and a marked systolic murmur.

NEUROLOGICAL EXAMINATION: Eyesight on the left side is extremely poor, with acuity of 20/200 and a myopia of $\frac{6}{8}$. The optic fundi show degenerative changes with pigmentation and a conjunctival injection on the left. There are subjective changes to touch and pain about the left face and an absence of both volitional and emotional facial movements on that side, while that eye cannot be closed tightly. There appears to be a left exophthalmus. Taste is absent on the left anterior aspect of the tongue. The left ear drum is lusterless and not transparent, the right slightly better.

URINE: Yellow; neutral; sp. gr. 1013; no sugar nor albumen.

BLOOD: 75% Hgb.(T); 5,060,000 R.B.C.; 8,800 W.B.C.; Kahn positive; pr.110/60.

LUMBAR PUNCTURE: I.P. 150; dynamics normal; 15 cc. removed; F.P. 70; appearance normal; 1 R.B.C.; negative Ross-Jones and Pandy; protein 33 mg/100 cc.; gold sol 0000000000; Wasserman negative.

S...P...: 4001, 5000; white; Age 35; Married.

DIAGNOSIS: Meningitis on chronic syphilitic basis, central nervous system

...the 7th, 8th, 9th, and 10th nerves - left.

The patient complains of vertigo, tinnitus and deafness in and around the left ear, radiating posteriorly, for the past few weeks. There was also deafness of the left mastoid region. Patient gives a history of a previous attack of aseptic meningitis with aseptic meningitis, but this is questionable. An extensive history is difficult because of foreign extraction and slight history.

PHYSICAL EXAMINATION: There is a noticeable left facial paralysis and a

marked systolic murmur.

NEUROLOGICAL EXAMINATION: Observed on the left side is extremely poor, with

activity of 20/200 and a visual field of 8. The optic fundi show degenerative changes with gliosis and a conjunctival injection on the left. There are subjective changes to touch and pain about the left face and an absence of both volitional and emotional facial movements on that side, while that eye cannot be closed tightly. There appears to be a left exotropia. Taste is absent on the left anterior aspect of the tongue. The left ear drum is flattened and not transparent, the right slightly better.

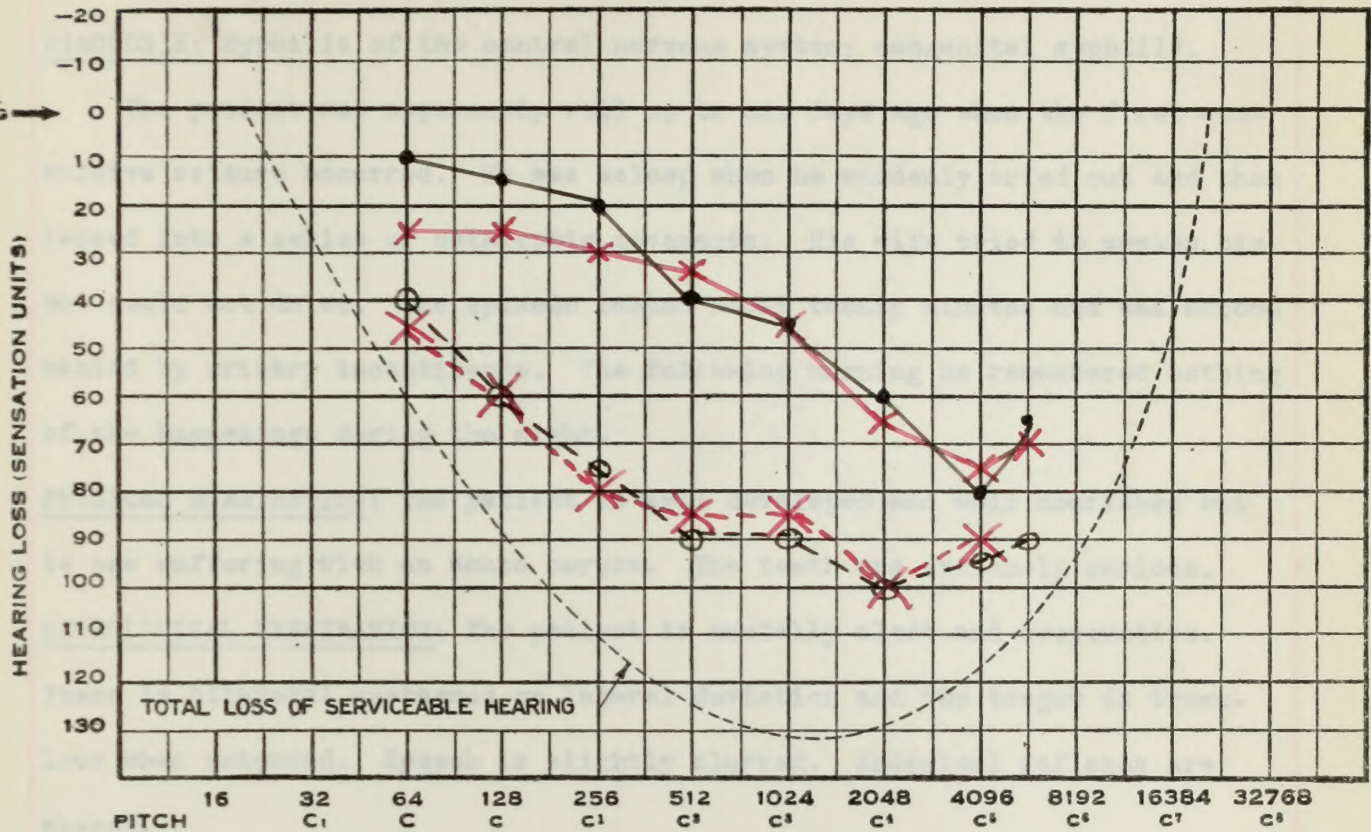
URINE: Yellow; neutral; sp. gr. 1.015; no sugar nor albumen.

BLOOD: WBC 15,000 (1); 5,000, 9,000, 8,000, 11,000, 12,000, 13,000, 14,000, 15,000; Kahn positive; 0.110/80.

LUMBAR PUNCTURE: 1.5, 1.60; dynamic normal; 15 cc. removed; 2.4, 1.70; pressure

normal; 1.5, 1.7; negative Wassermann and Kahn; protein 35 mg/100 cc.

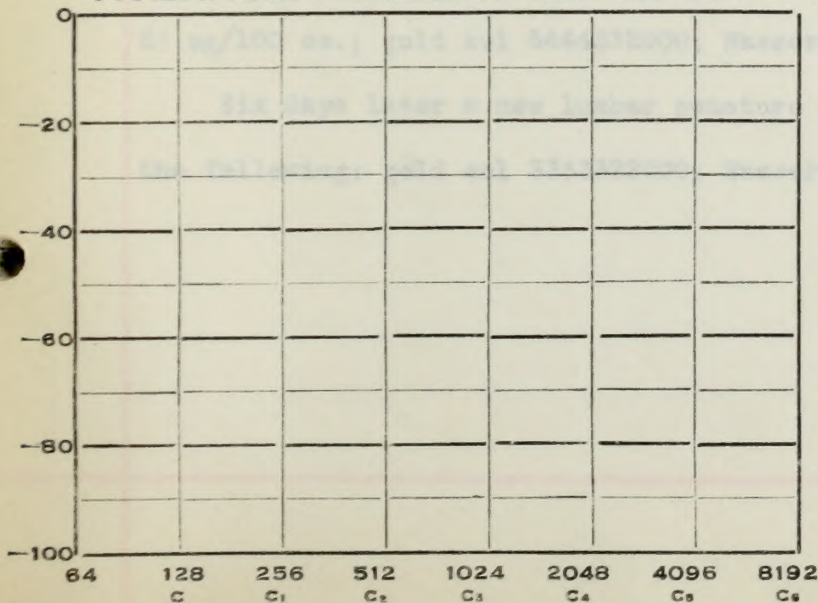
Gold test 000000000; Wassermann negative.

EVANS MEMORIAL**AUDIOGRAM**NAME *F. H.* 730271
DATE 19

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber Left at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne ^{AC}
BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

EVANS MEMORIAL

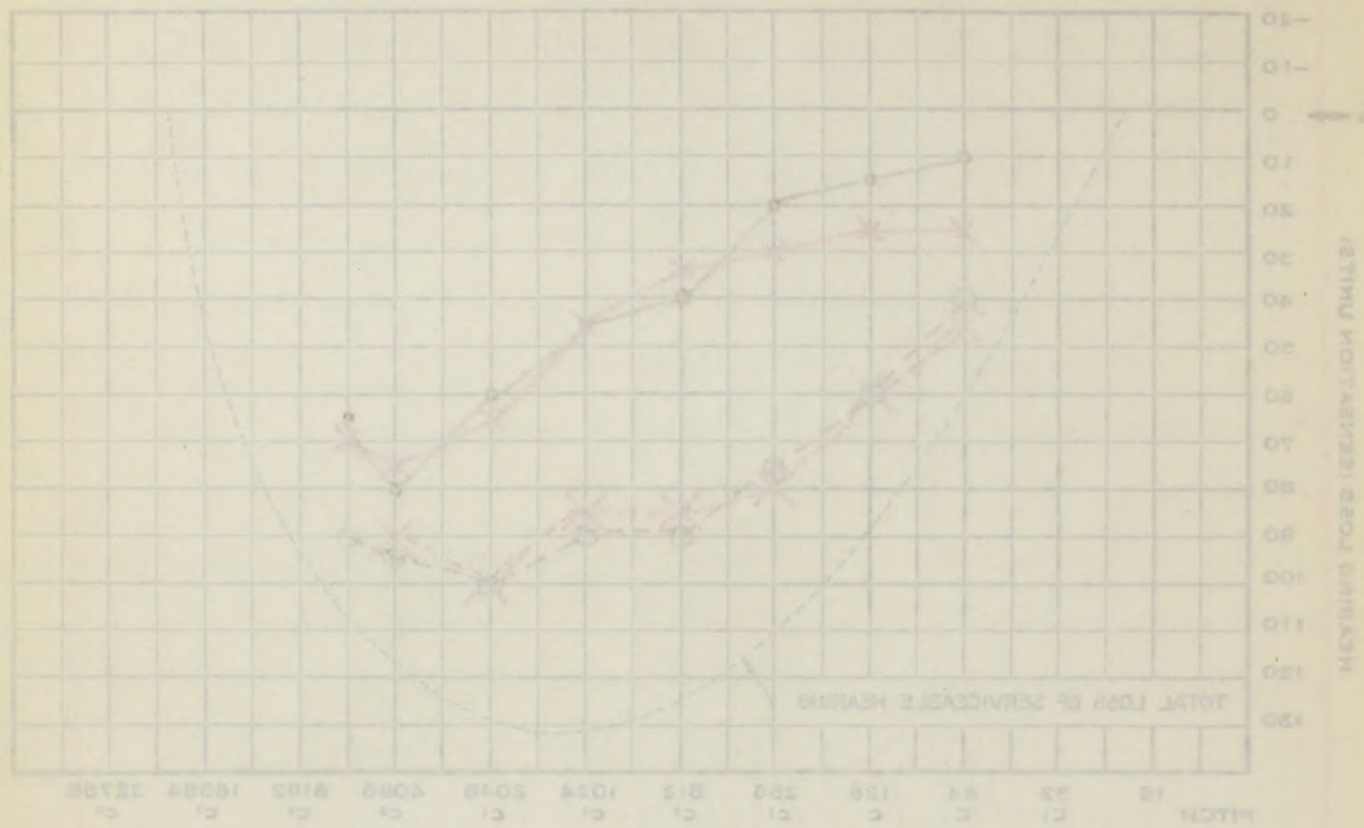
720271

F. H.

NAME

DATE

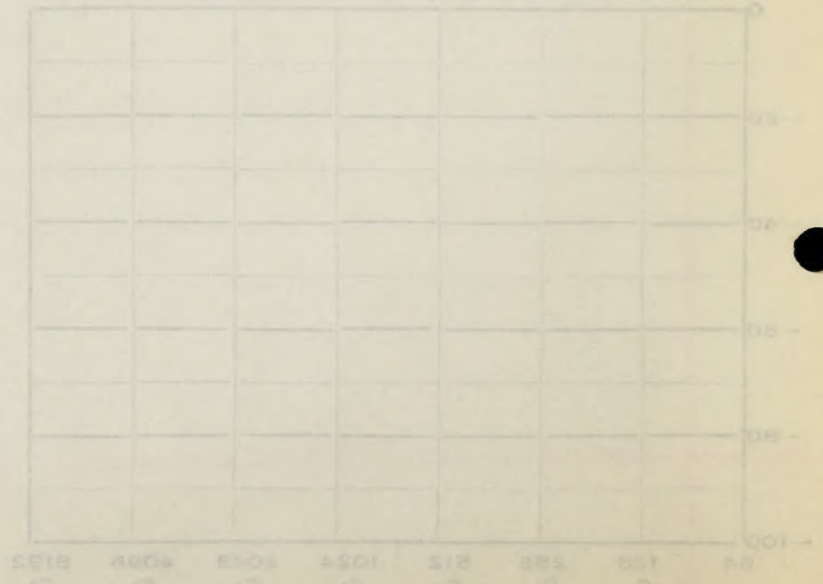
AUDIOGRAM



Percentage Hearing Loss
Right Ear
Left Ear

Weber Left at 4 points

AVERAGE PERCENTAGE LOSS



Right
Left
Knee
AC
Upper Limit
Lower Limit
Whisper
Voice
Dizziness
Headache
Tinnitus
Deafness
Pain
Discharge
Cold Symptoms
Discharge
Disease

F...H...; #730,271; Male; Age 28; White; Married.

DIAGNOSIS: Syphilis of the central nervous system; congenital syphilis.

The patient was apparently well up to six days ago when the first convulsive seizure occurred. He was asleep when he suddenly cried out and then lapsed into a series of cataleptic movements. His wife tried to awaken him but could not do so. The episode lasted about twenty minutes and was accompanied by urinary incontinence. The following morning he remembered nothing of the happenings during the night.

PHYSICAL EXAMINATION: The patient is well developed and well nourished but is now suffering with an acute coryza. The teeth are extremely carious.

NEUROLOGICAL EXAMINATION: The patient is mentally alert and cooperative.

There is bilateral nystagmus on lateral deviation and the tongue is tremulous when extended. Speech is slightly slurred. Abdominal reflexes are absent.

URINE: Yellow; alkaline; sp. gr. 1018; no sugar nor albumen.

BLOOD: 85% Hgb.(S); 4,830,000 R.B.C.; 9,300 W.B.C.; Kahn negative; N.P.N. 27; B.S. 54.

LUMBAR PUNCTURE: I.P. 130; dynamics normal; 15 cc. removed; F.P. 82; appearance clear, white; 4 W.B.C.; 2 R.B.C.; No Ross-Jones nor Pandy; protein 26 mg/100 cc.; gold sol 5444332000; Wasserman negative.

Six days later a new lumbar puncture yielded spinal fluid which gave the following: gold sol 3333322000; Wasserman negative.

P...H...: 4730, 2VI; Male; Age 28; White; Married.

DIAGNOSIS: Syphilis of the central nervous system; congenital syphilis.

The patient was apparently well up to six days ago when the first convulsive seizure occurred. He was asleep when he suddenly cried out and then layed into a series of cataleptic movements. His wife tried to awaken him but could not do so. The episode lasted about twenty minutes and was accompanied by urinary incontinence. The following morning he remembered nothing of the happenings during the night.

PHYSICAL EXAMINATION: The patient is well developed and well nourished but

is now suffering with an acute corpus. The teeth are extremely carious.

NEUROLOGICAL EXAMINATION: The patient is mentally alert and cooperative.

There is bilateral nystagmus on lateral deviation and the tongue is tremulous when extended. Speech is slightly slurred. Abdominal reflexes are

absent.

URINE: Yellow; alkaline; sp. gr. 1.018; no sugar nor albumen.

BLOOD: 854 Hgb. (8); 4,850,000 R.B.C.; 9,300 W.B.C.; Kahn negative; E.P.H. 27;

U.S. 84.

LUMBAR PUNCTURE: I.P. 150; dynamics normal; 15 cc. removed; E.P. 82; appear-

ance clear, white; 4 W.B.C.; 2 R.B.C.; No Hoes-Jones nor Pandey; protein

22 mg/100 cc.; Gold sol 8444332000; Wasserman negative.

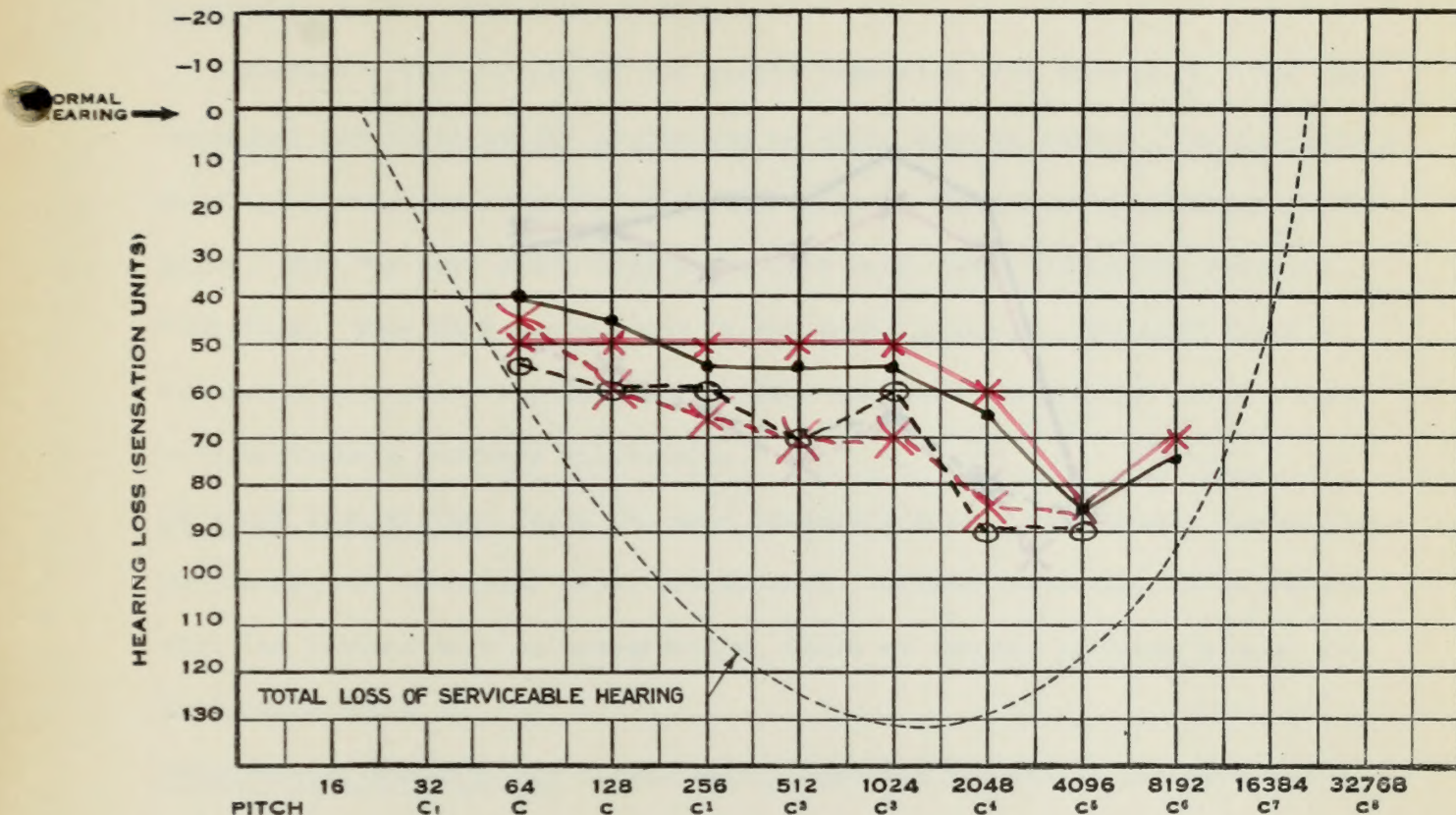
Six days later a new lumbar puncture yielded spinal fluid which gave

the following: Gold sol 8523332000; Wasserman negative.

EVANS MEMORIAL

AUDIOGRAM

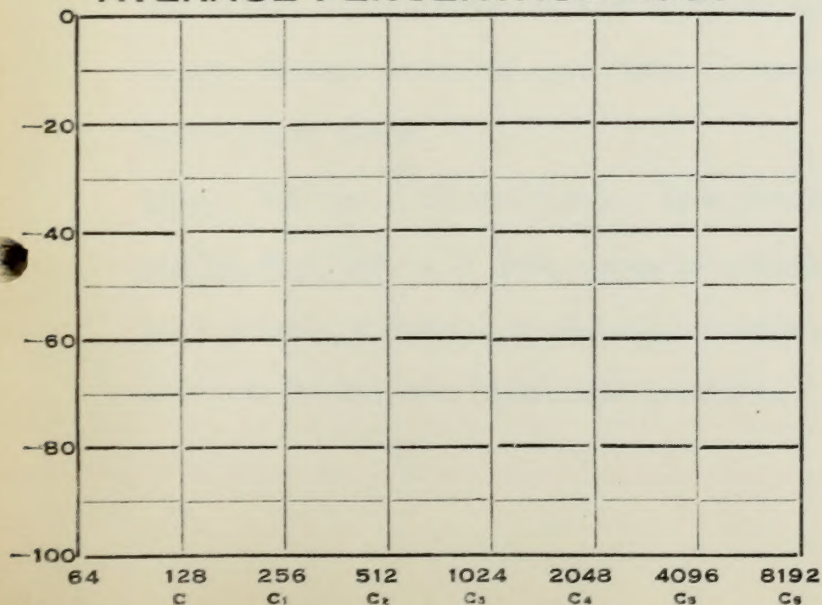
NAME L. R. W. 690550
DATE _____ 19__



Percentage Hearing Loss

Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Six Weeks Later
Anti-Infective Treatment
Weber Right at 4 Points
Weber Right at 4 Points

Disease
Duration
Chief Symptom.....
1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness
Right Left
..... Rinne AC
..... Weber BC
..... Upper Limit.....
..... Lower Limit.....
..... Whisper.....
..... Voice.....

EVANS MEMORIAL

690320

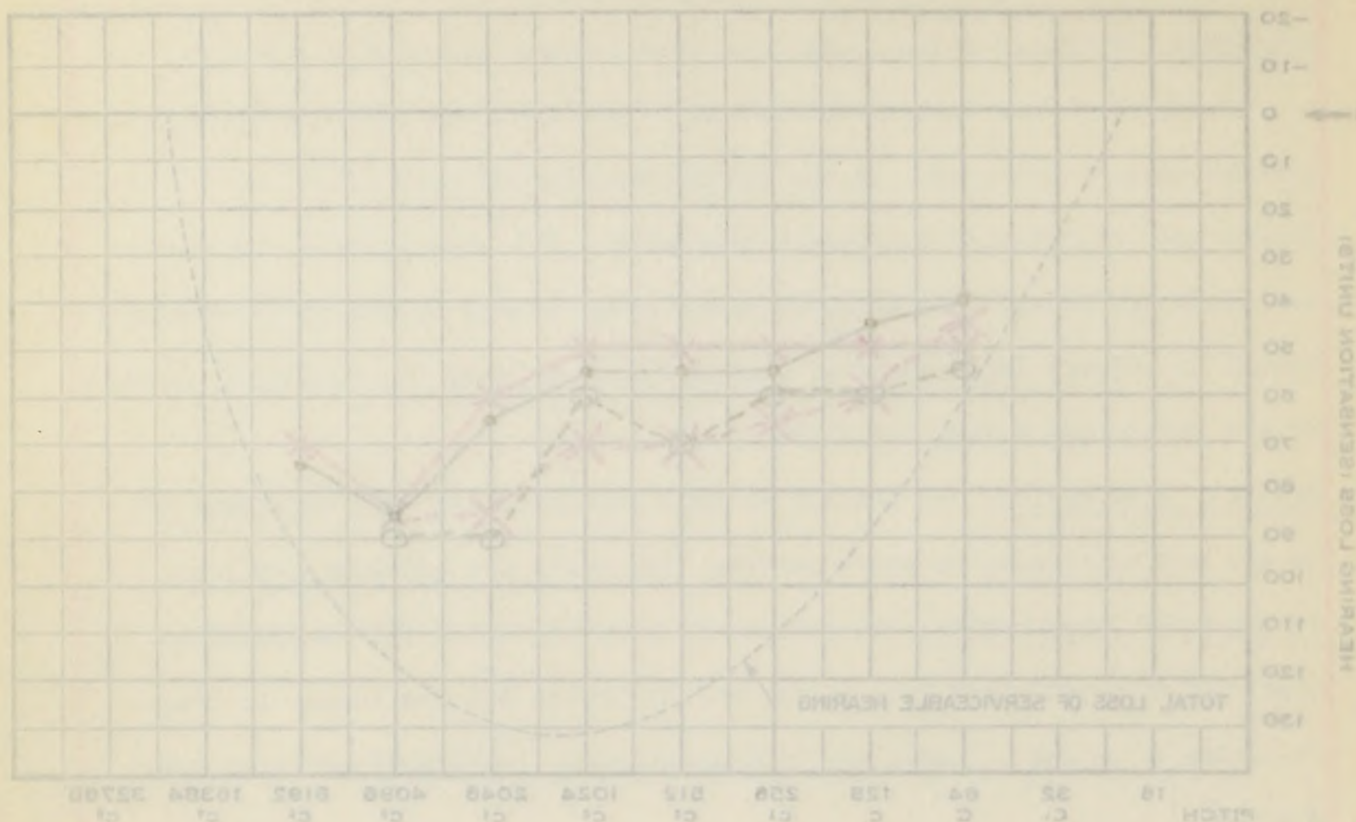
A.R.W.

NAME

AUDIOGRAM

DATE

19

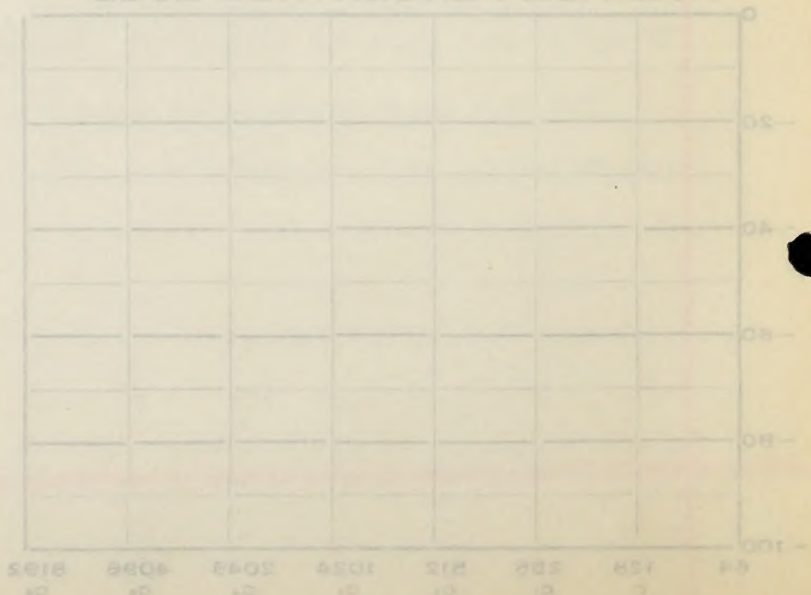


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber Right at 4 Points

1. Conductance
2. Resistance
3. Inductance
4. Capacitance
5. Impedance
6. Reactance

Right

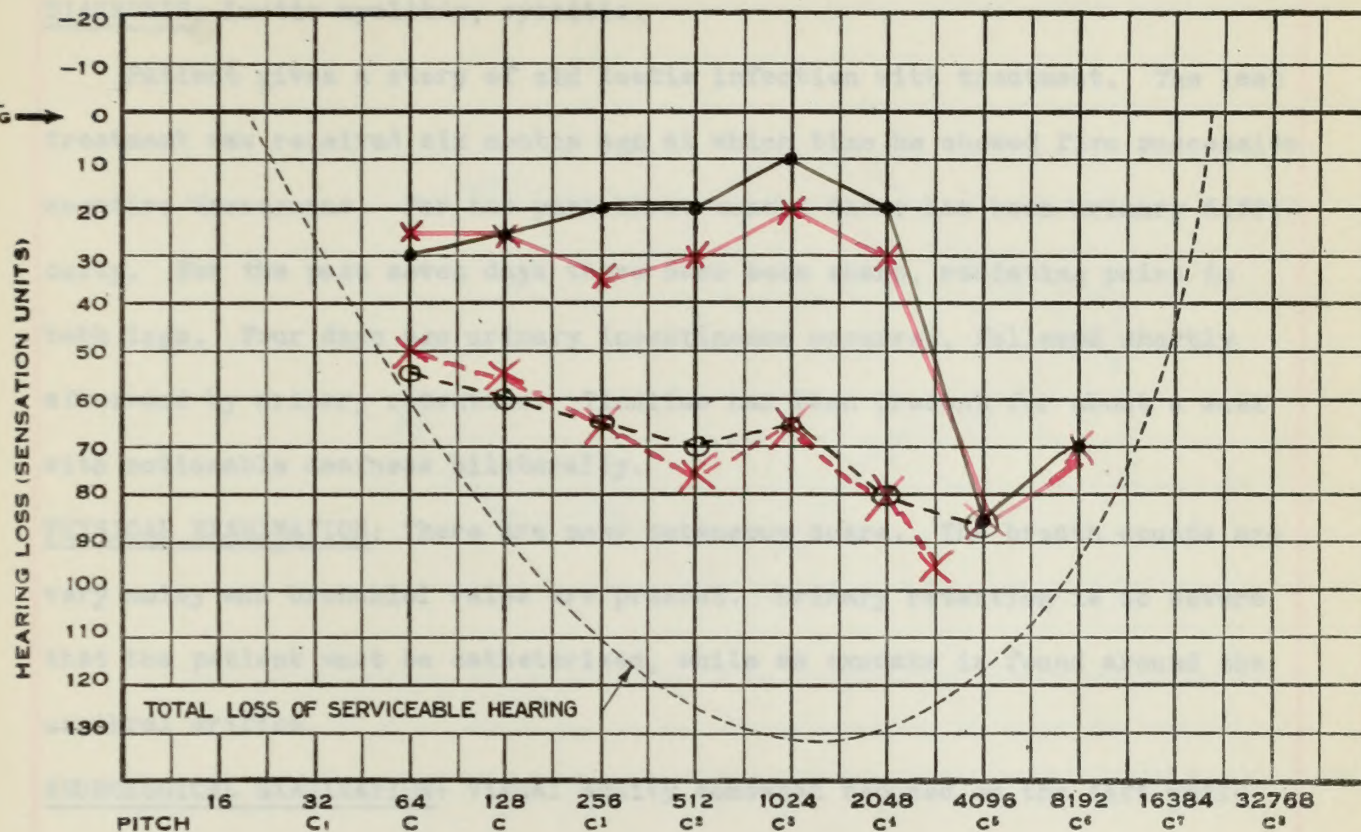
Left

Upper Limit

Lower Limit

Whisper

Voice

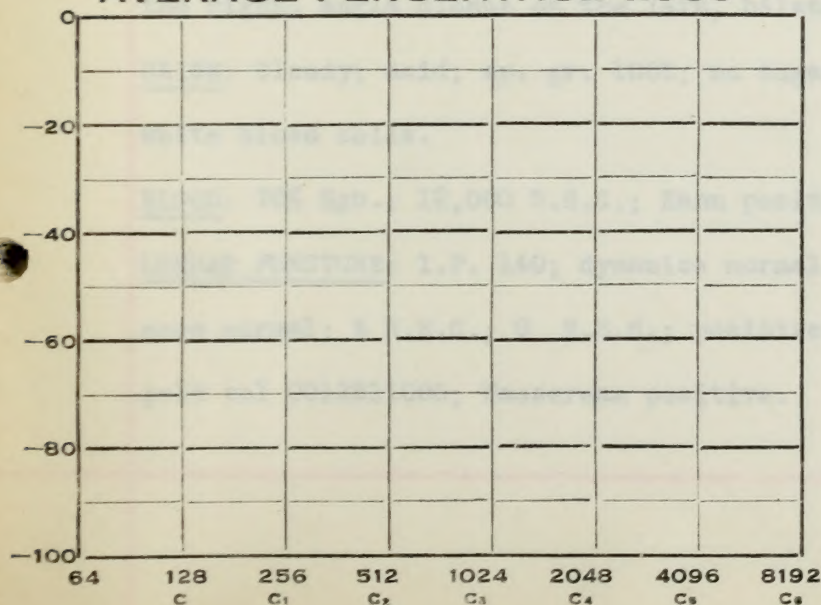
EVANS MEMORIAL**AUDIOGRAM**NAME L. R. W. 690550
DATE 19.....

Percentage Hearing Loss

Right Ear

Left Ear

Six Weeks Later
Anti-Juetic Treatment

AVERAGE PERCENTAGE LOSS*Weber Right at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeft

Rinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

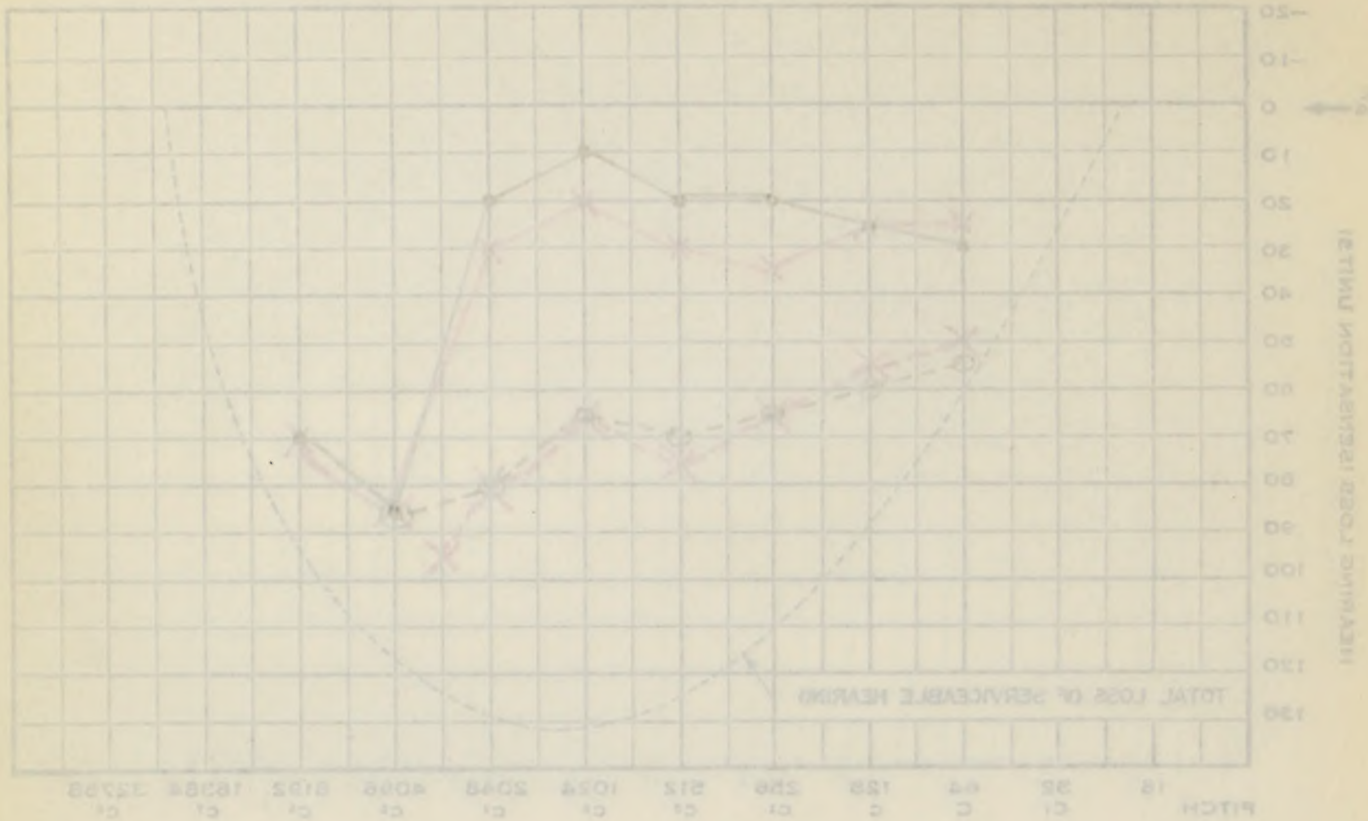
EVANS MEMORIAL

AUDIOGRAM

690320

NAME L.H.W.

DATE



Frequency Bands: Low

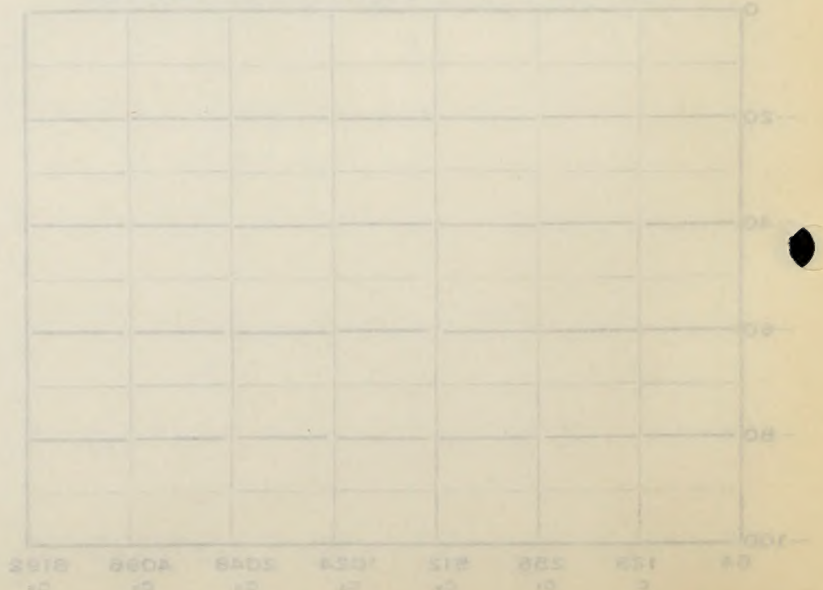
High Ear

Left Ear

Anti-Infective Treatment
Six Weeks Later

Weber Right at 4 Points

AVERAGE PERCENTAGE LOSS



Diagnosis

History

Chief Complaint

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right

Left

Rinne AC

Weber

Upper Limit

Lower Limit

Whisper

Voice

L...R...W...; #690,550; Male; Age 50; Colored; Single.

DIAGNOSIS: Luetic myelitis, cystitis.

Patient gives a story of old luetic infection with treatment. The last treatment was received six months ago at which time he showed five successive negative Wassermans. For the past three months there has been urinary difficulty. For the past seven days there have been sharp, radiating pains in both legs. Four days ago urinary incontinence occurred, followed shortly afterward by urinary retention. Tinnitus has been present for about a week with noticeable deafness bilaterally.

PHYSICAL EXAMINATION: There are many cutaneous scars. The breath sounds are very noisy and bronchial rales are present. Urinary retention is so severe that the patient must be catheterized, while an exudate is found around the urethral orifice.

NEUROLOGICAL EXAMINATION: Visual acuity somewhat reduced on the left while both fundi are pale, with accentuated cupping. The right pupil is larger than the left, fixed to light but reacts to accommodation, while the left pupil reacts poorly to light. The position is poor and gait labored, with a marked stiffness of the knee and hip joints. There is hypesthesia to pin-prick in the right leg. Abdominals and cremasterics are absent, Babinski on the right, ankle clonus on the left, bilateral Hoffman.

URINE: Cloudy; acid; sp. gr. 1008; no sugar nor albumen; sediment loaded with white blood cells.

BLOOD: 70% Hgb.; 12,000 W.B.C.; Kahn positive; N.P.N. 23; pressure 114/78.

LUMBAR PUNCTURE: I.P. 140; dynamics normal; 12 cc. removed; F.P. 70; appearance normal; 4 W.B.C.; 0 R.B.C.; positive Pandy; protein 44 mg/100 cc.; gold sol 0012211000; Wasserman positive.

Gold sol COLEZILCOO; Wasserman positive.

ance normal; 4 W.B.C.; 0 R.B.C.; positive Pandey; protein 44 mg/100 cc.

URINARY FUNCTION: I.P. 140; dynamics normal; 12 cc. removed; R.P. 70; appar-

BLOOD: 70% Hgb.; 12,000 W.B.C.; Kahn positive; R.P. 23; pressure 114/78.

white blood cells.

URINE: Cloudy; acid; sp. gr. 1008; no sugar nor albumen; sediment loaded with

the right, ankle clonus on the left, bilateral Hoffman.

prick in the right leg. Abdominal and cremasteric are absent, Babinski on

marked stiffness of the knee and hip joints. There is hyposthesia to pin-

pupil reacts poorly to light. The position is poor and fast labored, with a

than the left, fixed to right but reacts to accommodation, while the left

both fundi are pale, with accentuated cupping. The right pupil is larger

NEUROLOGICAL EXAMINATION: Visual acuity somewhat reduced on the left while

urethral orifice.

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PHYSICAL EXAMINATION: There are many cutaneous scars. The breath sounds are

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culity. For the past seven days there have been sharp, radiating pains in

negative Wassermann. For the past three months there has been urinary diffi-

treatment was received six months ago at which time he showed five successive

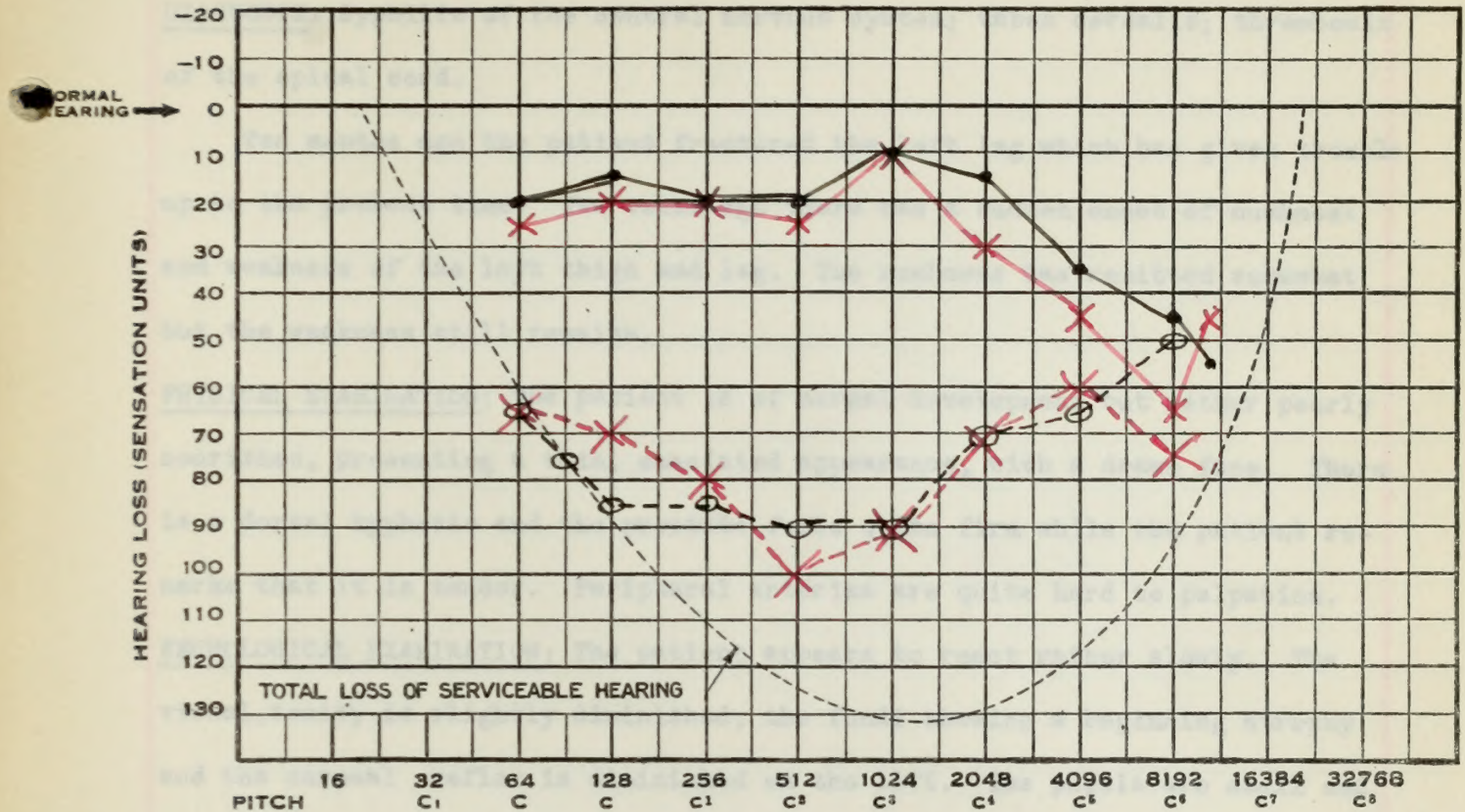
Patient gives a story of old luetic infection with treatment. The last

DIAGNOSIS: Luetic myelitis, cystitis.

L...R...W....; 4880, 550; Male; Age 50; Colored; Single.

EVANS MEMORIAL**AUDIOGRAM**NAME *F. H.* 730876.

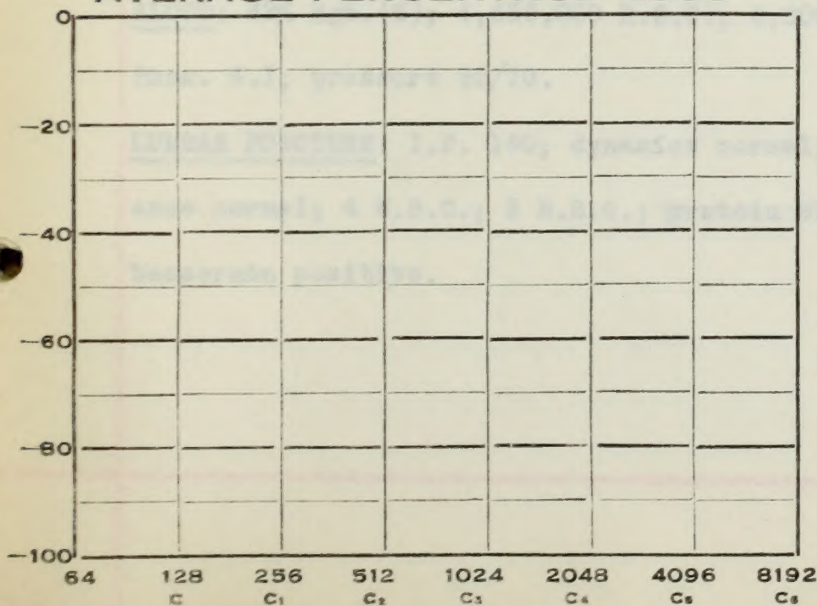
DATE 19



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber = at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

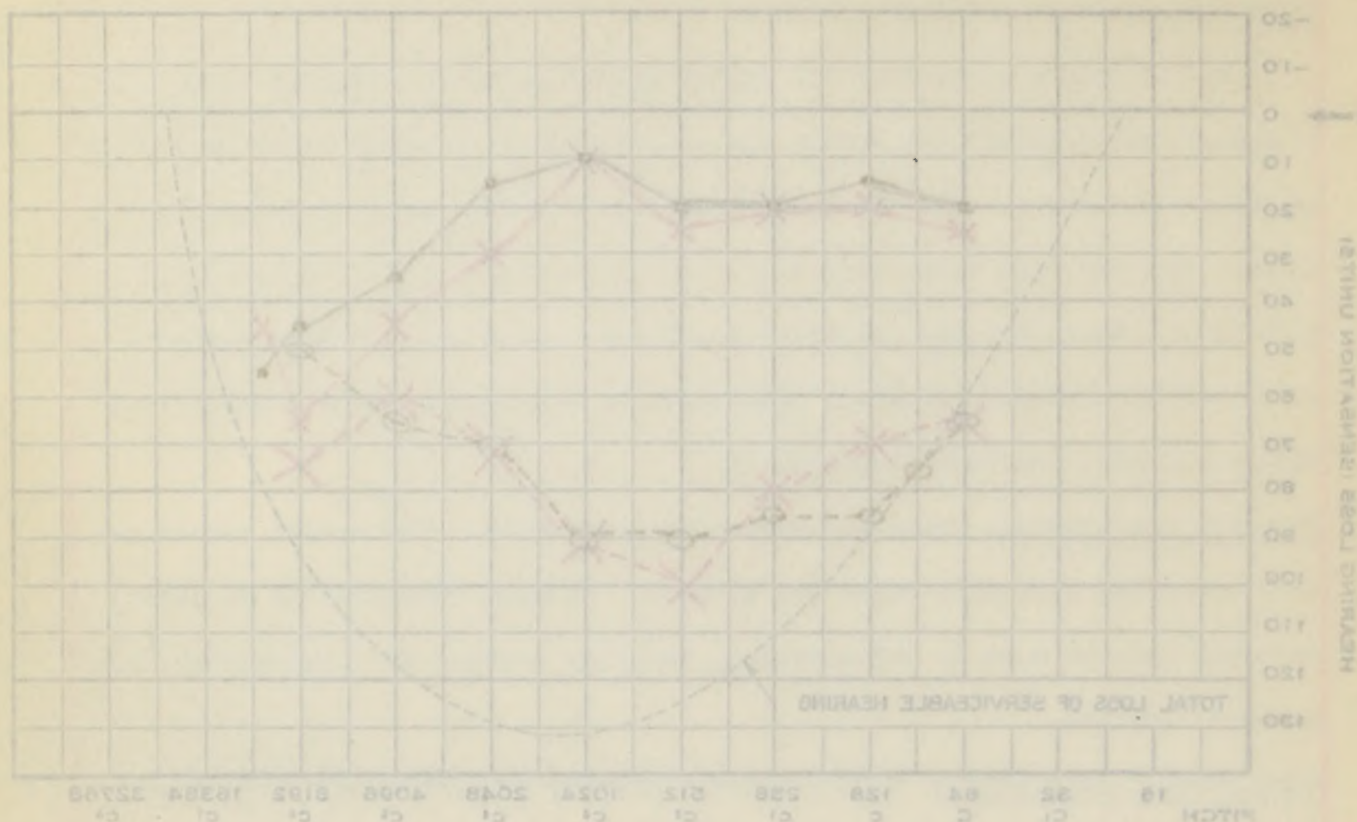
730876

F.H.

NAME

DATE

AUDIOGRAM



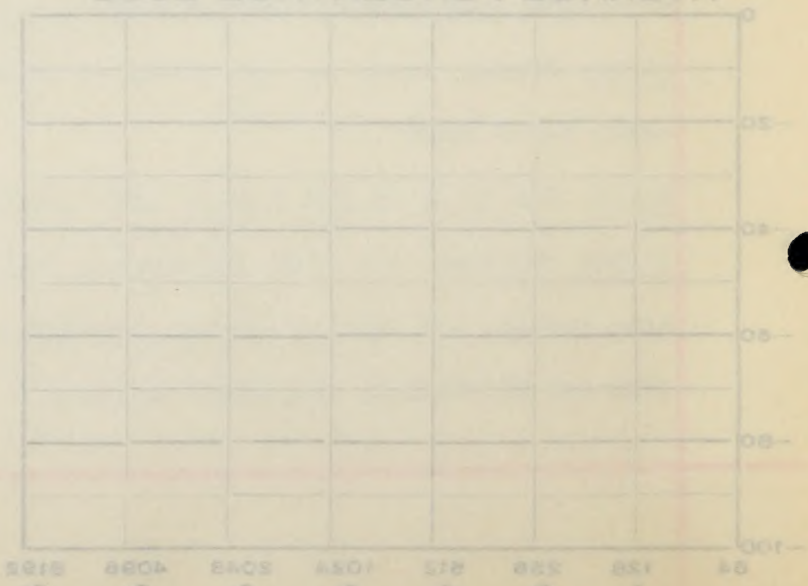
Percentage Hearing Loss

Right Ear

Left Ear

Webster = at H Point

AVERAGE PERCENTAGE LOSS



Diagnosis

Duration

Chief Complaint

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right

Left

Rinne AC

BC

Webster

Upper Limit

Lower Limit

Whisper

Voice

F...H...; #730,876; Male; Age 45; White; Single.

DIAGNOSIS: Syphilis of the central nervous system; tabes dorsalis; thrombosis of the spinal cord.

Ten months ago the patient fractured the left leg which has given trouble up to the present time. Two weeks ago there was a sudden onset of numbness and weakness of the left thigh and leg. The numbness has remitted somewhat but the weakness still remains.

PHYSICAL EXAMINATION: The patient is of normal development but rather poorly nourished, presenting a thin, emaciated appearance, with a drawn face. There is a dorsal kyphosis and the prostate feels quite firm while the patient remarks that it is tender. Peripheral arteries are quite hard to palpation.

NEUROLOGICAL EXAMINATION: The patient appears to react rather slowly. The visual acuity is slightly diminished, the fundi showing a beginning atrophy and the corneal reflex is diminished on the left. The pupils are small and fixed. The patient lies in bed with a poor posture, the left leg lying limp with diminished vibratory sense over its entirety. There is hypesthesia to pain and temperature in both legs. Knee jerk not obtained on the left and ankle jerk not obtained bilaterally.

URINE: Amber; acid; sp. gr. 1018; no sugar nor albumen.

BLOOD: 82% Hgb.(S); 4,650,000 R.B.C.; 6,800 W.B.C.; Kahn negative; Ca. 9.0; Phos. 4.1; pressure 95/70.

LUMBAR PUNCTURE: I.P. 140; dynamics normal; 8 cc. removed; F.P. 120; appearance normal; 4 W.B.C.; 3 R.B.C.; protein 69 mg/100 cc.; gold sol 0112332110; Wasserman positive.

P...H...; 4730, 876; Male; Age 45; White; Single.

DIAGNOSIS: Syphilis of the central nervous system; tabes dorsalis; thrombotic

of the spinal cord.

Ten months ago the patient fractured the left leg which has given trouble

up to the present time. Two weeks ago there was a sudden onset of numbness

and weakness of the left thigh and leg. The numbness has recurred somewhat

but the weakness still remains.

PHYSICAL EXAMINATION: The patient is of normal development but rather poorly

nourished, presenting a thin, emaciated appearance, with a drawn face. There

is a dorsal hypostosis and the prostate feels quite firm while the patient re-

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NEUROLOGICAL EXAMINATION: The patient appears to react rather slowly. The

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and the corneal reflex is diminished on the left. The pupils are small and

fixed. The patient lies in bed with a poor posture, the left leg lying limp

with diminished vibratory sense over its entirety. There is hyposthesia to

pain and temperature in both legs. Knee jerk not obtained on the left and

ankle jerk not obtained bilaterally.

URINE: Amber; acid; sp. gr. 1.018; no sugar nor albumen.

BLOOD: Hgb. (2); 4,650,000 R.B.C.; 8,800 W.B.C.; Echin negative; Ca. 9.0;

Phos. 4.1; pressure 95/70.

HUMAN FUNCTIONS: I.P. 140; dynamics normal; B co. removed; S.P. 120; appear-

ance normal; + W.B.C.; 2 R.B.C.; protein 68 mg/100 cc.; total sol. 0.12332110;

Wasserman positive.

EVANS MEMORIAL**AUDIOGRAM**

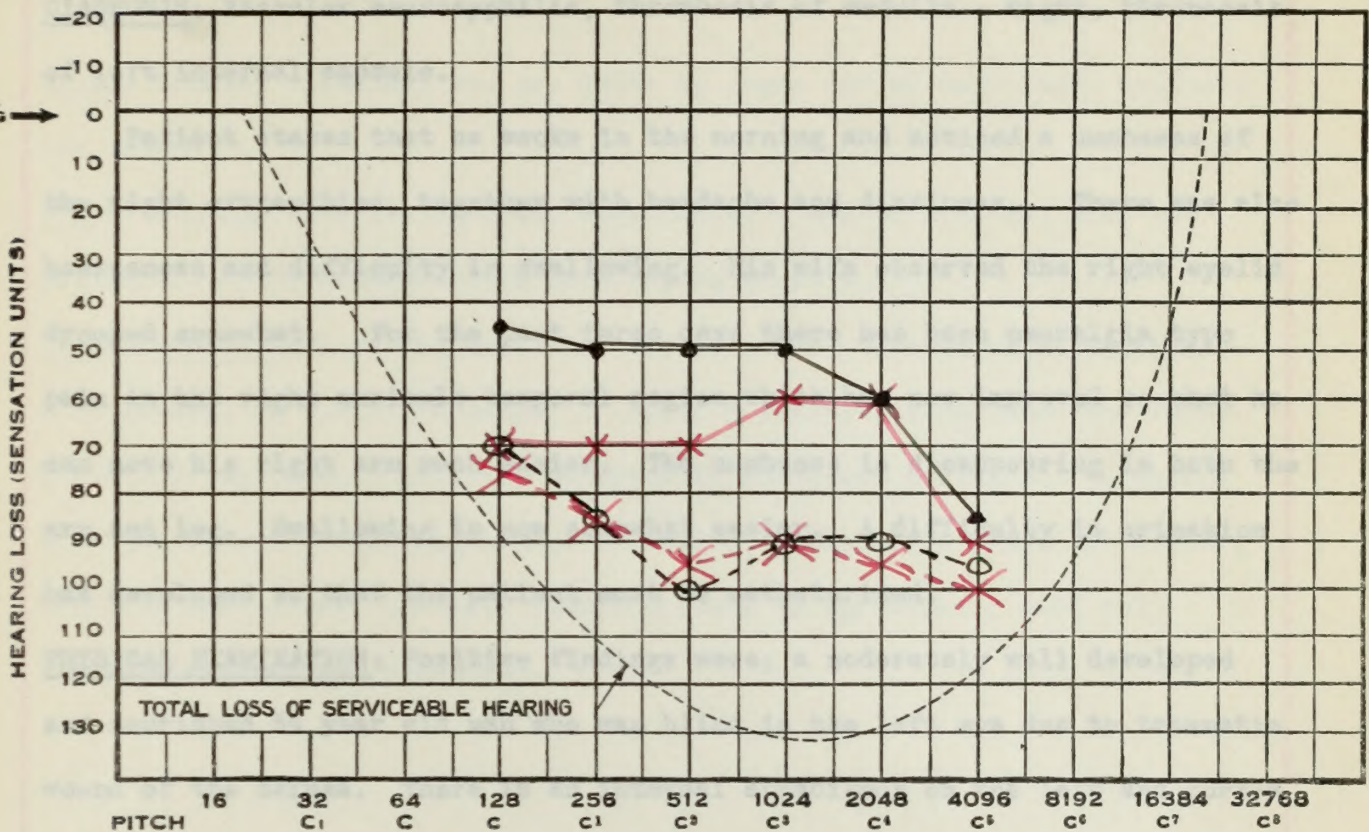
NAME

T.D.

738340

DATE

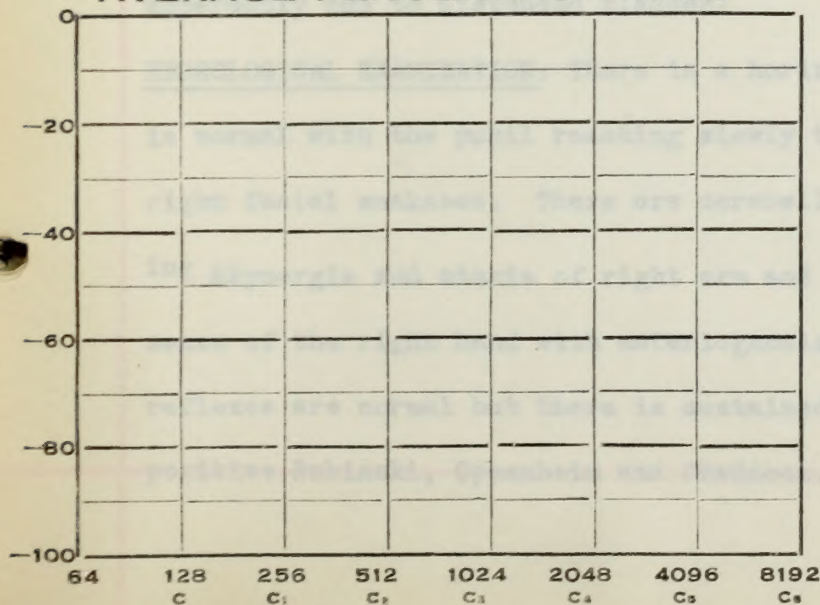
19



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber Right at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

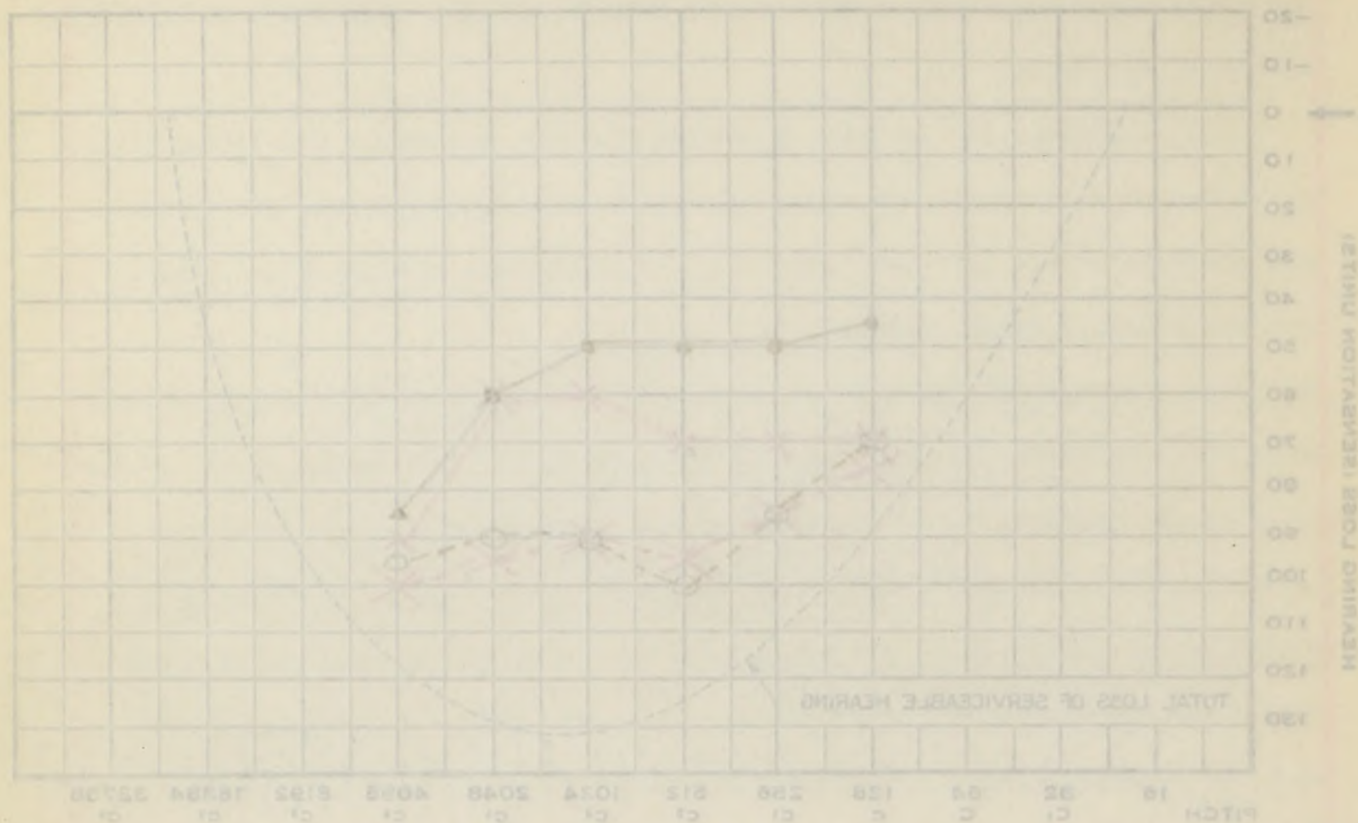
738340

T.N.

NAME

DATE

AUDIOGRAM

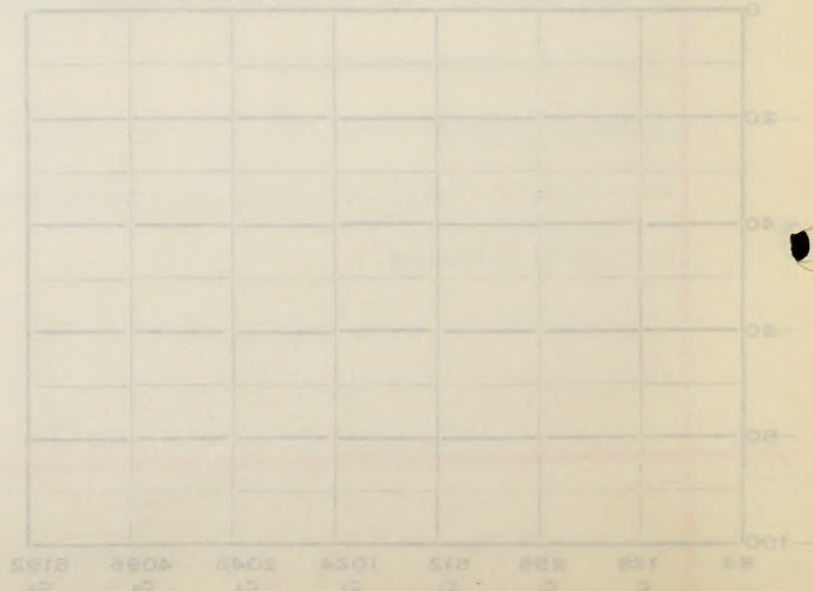


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber Right at 4 Points

Right

Left

Upper Limit

Lower Limit

Whisper

Voice

T...D...; #738,340; Male; Age 54; White; Married.

DIAGNOSIS: Vascular neurosyphilis, thrombosis of medulla - right, thrombosis of left internal capsule.

Patient states that he awoke in the morning and noticed a numbness of the right extremities, together with headache and dizziness. There was also hoarseness and difficulty in swallowing. His wife observed the right eyelid drooped somewhat. For the past three days there has been neuralgia type pain in the right auriculo temporal region which has now improved so that he can move his right arm much easier. The numbness is disappearing in both the arm and leg. Swallowing is now somewhat easier. A difficulty in urination has developed so that the patient must be catheterized.

PHYSICAL EXAMINATION: Positive findings were; a moderately well developed and nourished 54 year old man who was blind in the left eye due to traumatic wound of the cornea. There is an internal strabismus on the left and cornea is so hazy that the fundus cannot be seen. The right pupil reacts sluggishly to light. The chest is emphysematous in type, apparently chronic, and hyperresonant to percussion, while auscultation shows increased breath sounds. The heart is slightly enlarged but no murmurs were heard. The abdomen is scaphoid in type with a tumor mass palpable below the level of the umbilicus, apparently due to distended bladder.

NEUROLOGICAL EXAMINATION: There is a horizontal nystagmus. The right disc is normal with the pupil reacting slowly to light. There is an apparent right facial weakness. There are cerebellar signs with abnormal past pointing asynergia and ataxia of right arm and leg. There is diminished position sense of the right hand with asteriognosis on the right side. The tendon reflexes are normal but there is sustained clonus on the right and bilateral positive Babinski, Oppenheim and Chaddock. There is hyperesthesia to

T...D...: 4/28, 340; Male; Age 55; White; Married.

DIAGNOSIS: Vascular neurosyphilis, thrombosis of middle - right, thrombosis

of left internal capsule.

Patient states that he awoke in the morning and noticed a numbness of the right extremities, together with headache and dizziness. There was also hoarseness and difficulty in swallowing. His wife observed the right eyelid drooped somewhat. For the past three days there has been neuritis type pain in the right auricular temporal region which has now improved so that he can move his right arm much easier. The numbness is disappearing in both the arm and leg. Swallowing is now somewhat easier. A difficulty in urination has developed so that the patient must be catheterized.

PHYSICAL EXAMINATION: Positive findings were; a moderately well developed and nourished 54 year old man who was blind in the left eye due to traumatic wound of the cornea. There is an internal strabismus on the left and cornea is so hazy that the fundus cannot be seen. The right pupil reacts sluggishly to light. The chest is emphysematous in type, apparently chronic, and hyperresonant to percussion, while auscultation shows increased breath sounds. The heart is slightly enlarged but no murmurs were heard. The abdomen is scaphoid in type with a tumor mass palpable below the level of the umbilicus, apparently due to distended bladder.

NEUROLOGICAL EXAMINATION: There is a horizontal nystagmus. The right disc is normal with the pupil reacting slowly to light. There is an apparent right facial weakness. There are cerebellar signs with abnormal past pointing the synergia and ataxia of right arm and leg. There is diminished position sense of the right hand with astereognosis on the right side. The tendon reflexes are normal but there is sustained clonus on the right and bilateral positive Babinski, Oppenheim and Shaddock. There is hyperesthesia to

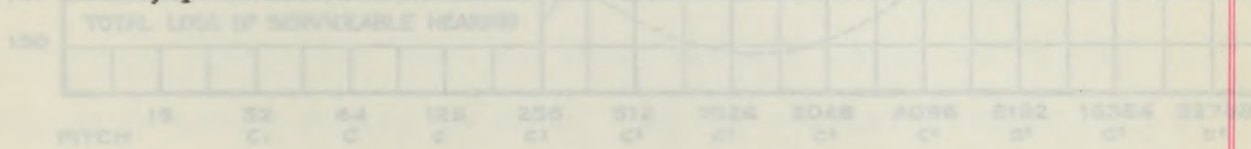
EVANS MEMORIAL

pin-prick on the right and possible slight impairment to temperature sense on the left.

URINE: Orange; alkaline; sp. gr. 1025; no sugar nor albumen; many crystals and debris.

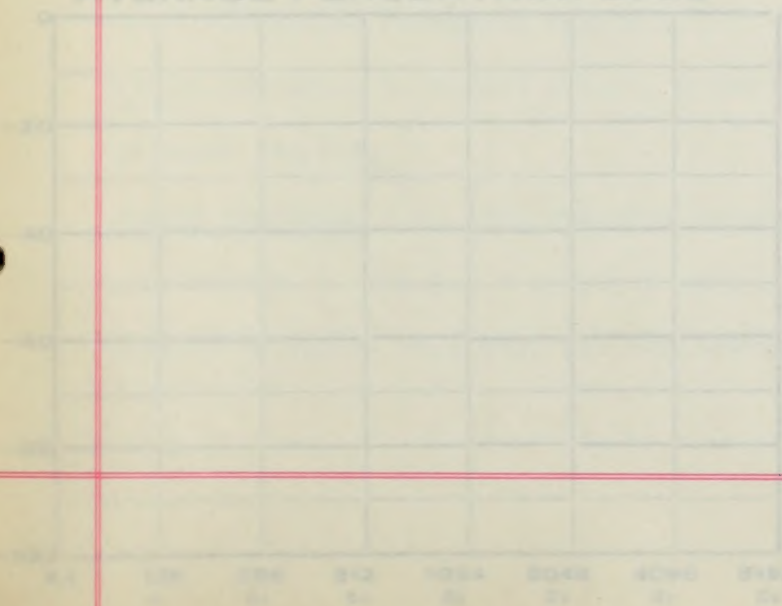
BLOOD: 95% Hgb.(S); R.B.C. 5,450,000; W.B.C. 9,200; N.P.N. 29; B.S. 87; pressure 140/90; Kahn positive with repeat positive.

LUMBAR PUNCTURE: I.P. 70; dynamics normal; 15 cc. removed; F.P. 0; appearance normal; 15 W.B.C.; 0 polys; 0 R.B.C.; positive Ross-Jones and Pandy; protein 64 mg/100cc.; gold sol 4555543210; Wasserman positive. A second puncture showed normal appearance of fluid; 15 W.B.C.; 0 polys; 25 R.B.C.; negative Ross-Jones; positive Pandy; protein 66 mg/100 cc.; gold sol 5555543210; positive Wasserman.



Weber = at 4 Points

AVERAGE PERCENTAGE LOSS



Diagnosis _____
 Duration _____
 Chief Symptoms _____
 1. Discharge _____
 2. Pain _____
 3. Discharge _____
 4. Tenderness _____
 5. Headache _____
 6. Discharge _____
 Date _____
 State _____
 Weber _____
 Upper Limb _____
 Lower Limb _____
 Weight _____
 Height _____

pin-prick on the right and possible slight impairment to temperature sense on the left.

URINE: Orange; alkaline; sp. gr. 1.025; no sugar nor albumen; many crystals and debris.

BLOOD: 95% Hgb. (2); R.B.C. 5,450,000; W.B.C. 8,300; N.P.W. 29; B.S. 87;

pressure 140/90; Kahn positive with repeat positive.

UMBILICAL FUNDUS: I.P. 70; gynecologic normal; 15 cc. removed; E.P. 0; appear-

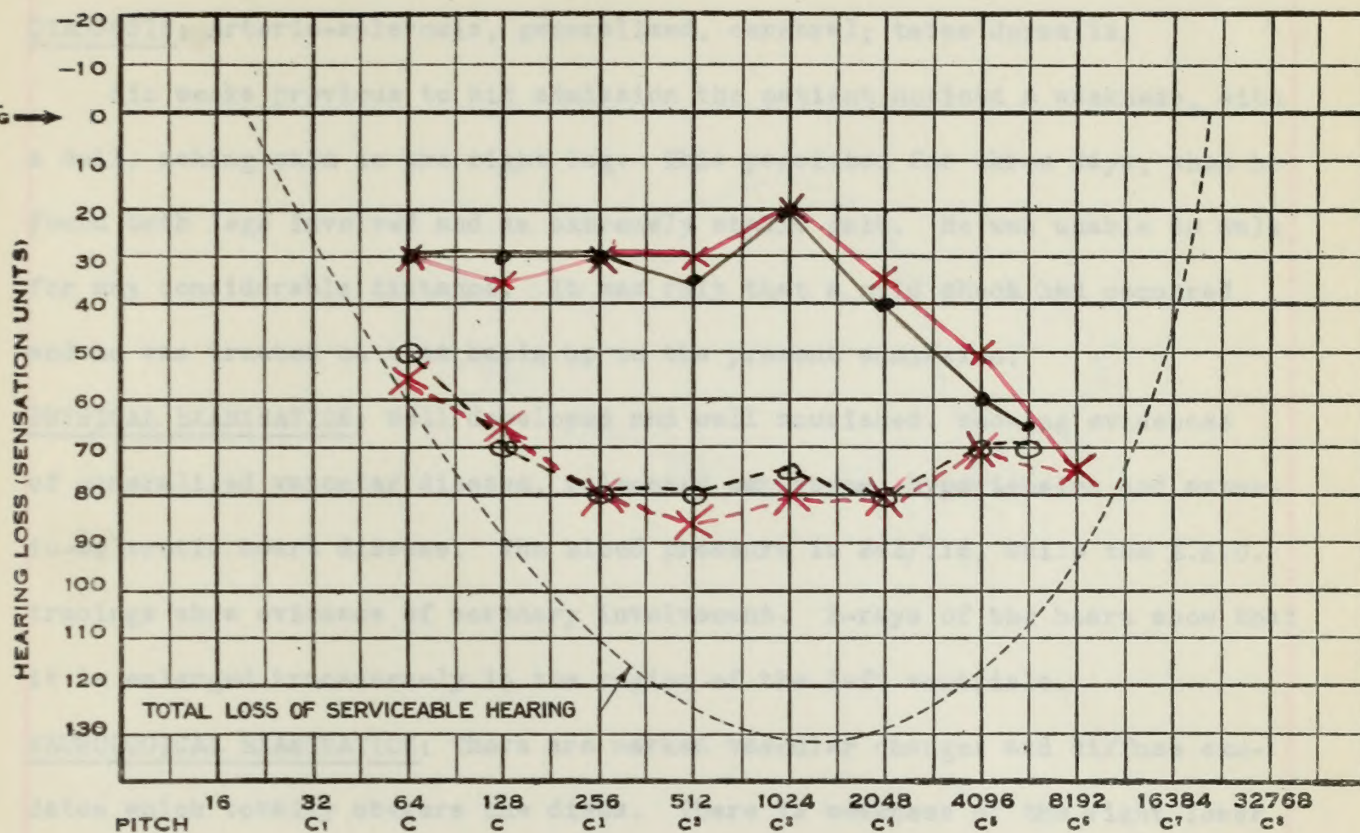
ance normal; 15 W.B.C.; 0 polys; 0 R.B.C.; positive Rosen-Jones and Pandy;

protein 64 mg/100cc.; gold sol 4555843210; Wasserman positive. A second

puncture showed normal appearance of fluid; 15 W.B.C.; 0 polys; 25 R.B.C.;

negative Rosen-Jones; positive Pandy; protein 68 mg/100 cc.; gold sol

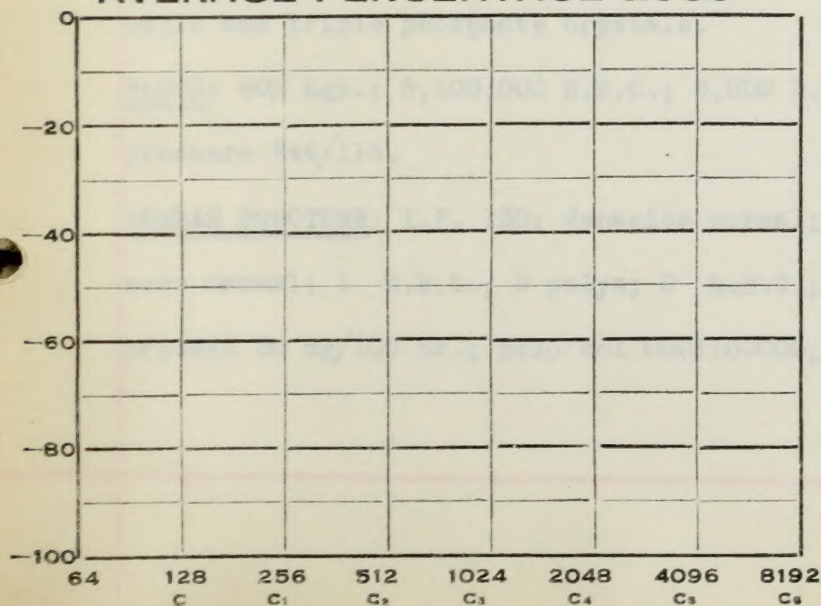
5555843210; positive Wasserman.

EVANS MEMORIAL**AUDIOGRAM**NAME J. S. 716 663
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

Weber = at 4 Points

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

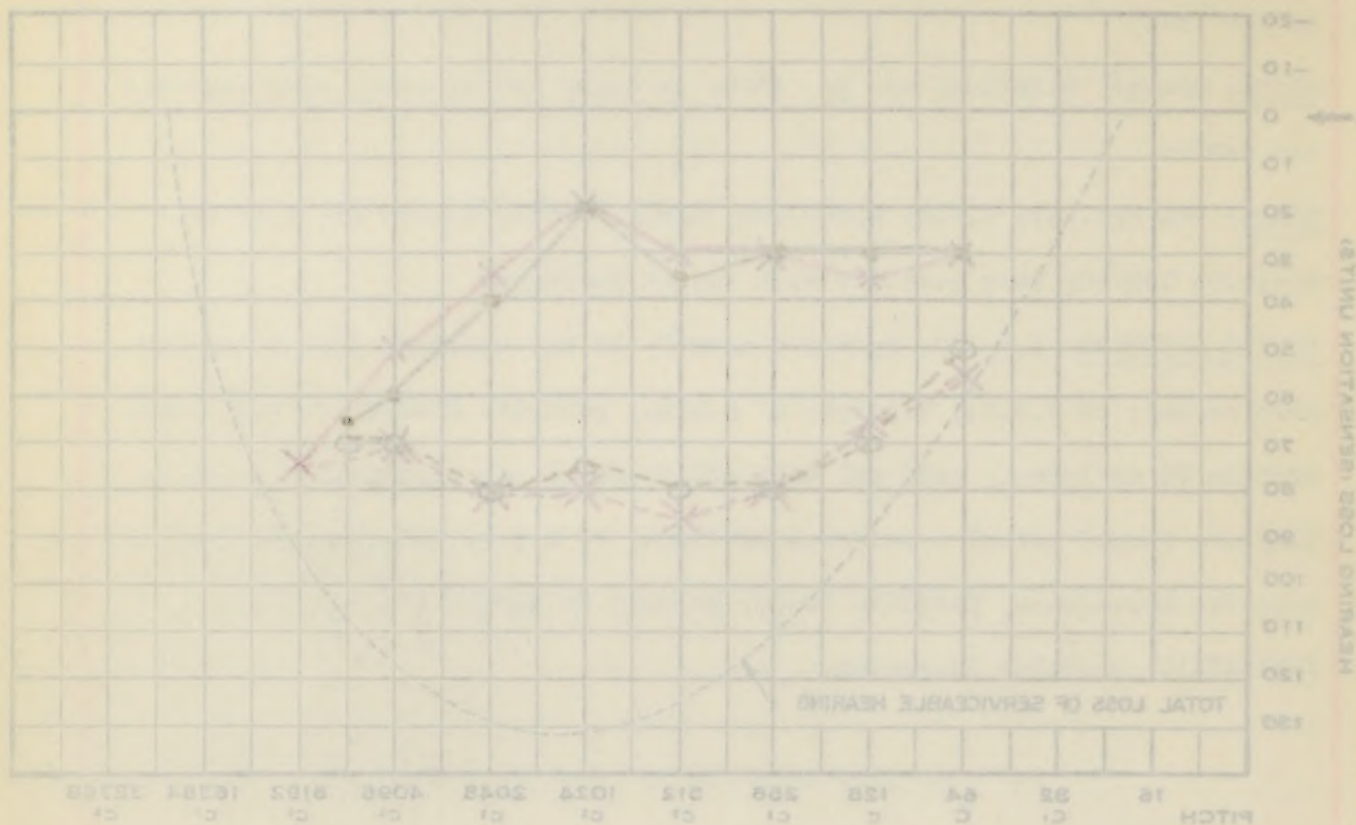
EVANS MEMORIAL

AUDIOGRAM

NAME J. G.

7/16/63

DATE



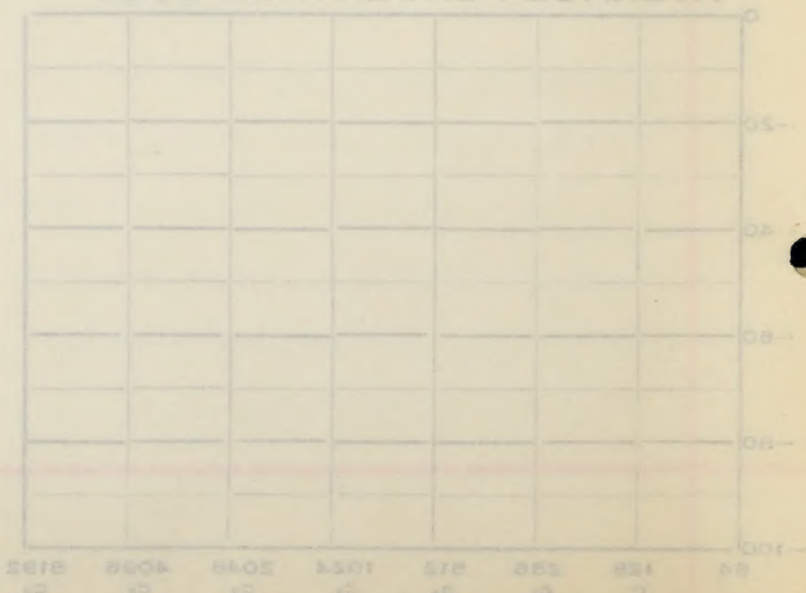
Percentage Hearing Loss

Right Ear

Left Ear

Weber = at 4 Points

AVERAGE PERCENTAGE LOSS



Right

Left

Right

Left

Upper Limit

Lower Limit

Whisper

Voice

J... S...; #716,663; Male; Age 48; White; Single.

DIAGNOSIS: Arterio-sclerosis, generalized, cerebral; tabes dorsalis.

Six weeks previous to his admission the patient noticed a weakness, with a dull, aching pain in the right leg. This persisted for three days, when he found both legs involved and an extremely ataxic gait. He was unable to walk for any considerable distance. It was felt that a mild shock had occurred and he was treated on that basis up to the present admission.

PHYSICAL EXAMINATION: Well developed and well nourished, showing evidences of generalized vascular disease, pulmonary emphysema, hypertension and arterio-sclerotic heart disease. The blood pressure is 242/118, while the E.K.G. tracings show evidence of coronary involvement. X-rays of the heart show that it is enlarged transversely in the region of the left ventricle.

NEUROLOGICAL EXAMINATION: There are marked vascular changes and diffuse exudates which totally obscure the discs. There is weakness of the right, lower face. The right knee jerk is hyperactive but ankle jerks are not present on either side. The Chaddock is positive on the right, while heel to shin tests are done only with difficulty. Vibration sense is impaired in both lower extremities. The gait could not be studied accurately.

URINE: Amber; alkaline; sp. gr. 1020; no sugar nor albumen; few white blood cells and triple phosphate crystals.

BLOOD: 80% Hgb.; 5,100,000 R.B.C.; 9,000 W.B.C.; Kahn negative; N.P.N. 34; pressure 244/118.

LUMBAR PUNCTURE: I.P. 130; dynamics normal; 15 cc. removed; F.P. 55; appearance normal; 1 W.B.C.; 0 polys; 0 R.B.C.; no Ross-Jones; positive Pandy; protein 30 mg/100 cc.; gold sol 0001100000; Wasserman negative.

... S...; Wt 16.833; Age 48; White; Single.

DIAGNOSIS: Arterio-sclerosis, generalized, cerebral; pares dorsalis.

Six weeks previous to his admission the patient noticed a weakness, with a dull, aching pain in the right leg. This persisted for three days, when he found both legs involved and an extremely ataxic gait. He was unable to walk for any considerable distance. It was felt that a mild shock had occurred

and he was treated on that basis up to the present admission.

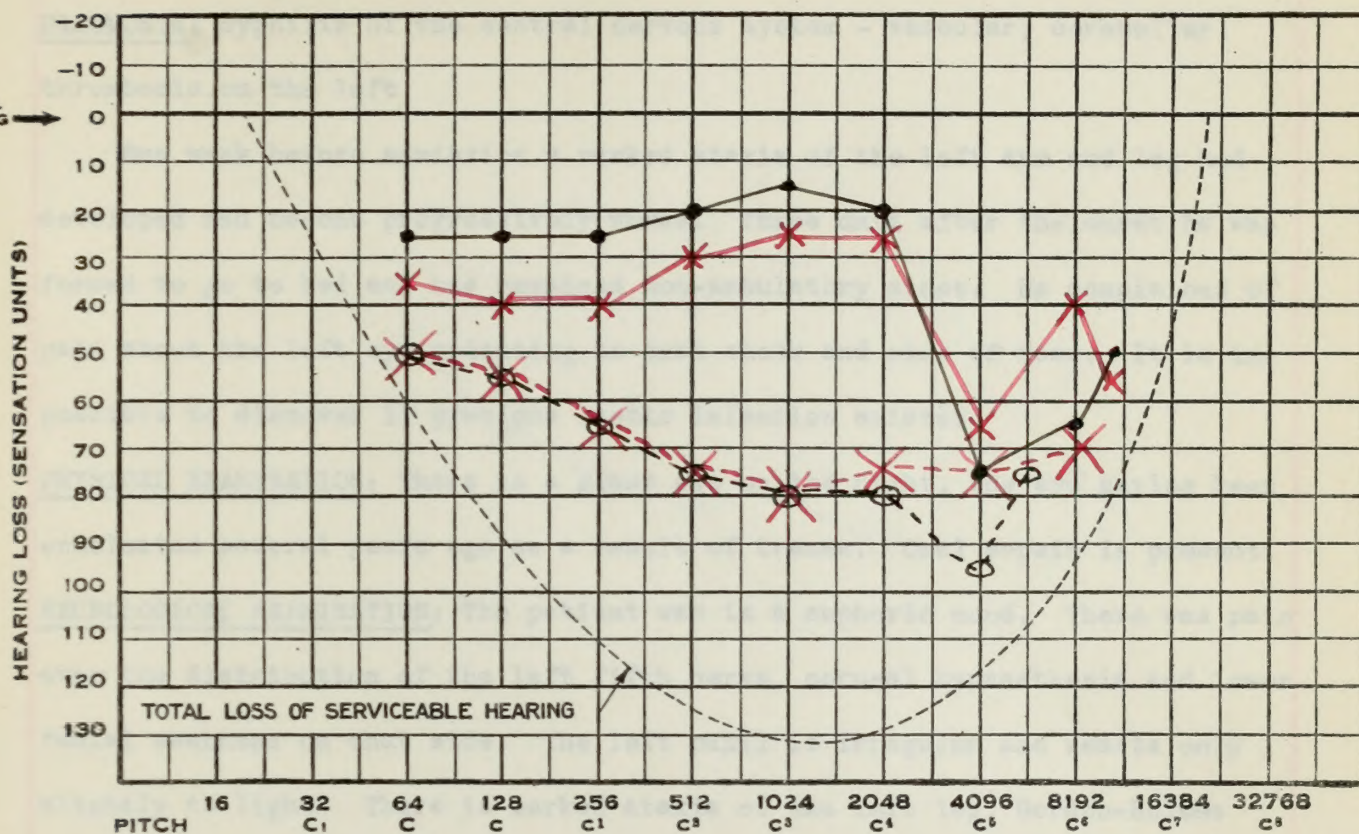
PHYSICAL EXAMINATION: Well developed and well nourished, showing evidences of generalized vascular disease, pulmonary emphysema, hypertension and arterio-sclerotic heart disease. The blood pressure is 245/118, while the R.A.O. tracings show evidence of coronary involvement. X-rays of the heart show that it is enlarged transversely in the region of the left ventricle.

NEUROLOGICAL EXAMINATION: There are marked vascular changes and diffuse paresis which totally obscure the discs. There is weakness of the right, lower legs. The right knee jerk is hyperactive but ankle jerks are not present on either side. The Chaddock is positive on the right, while heel to shin tests are done only with difficulty. Vibration sense is impaired in both lower extremities. The gait could not be studied accurately.

URINE: Amber; alkaline; sp. gr. 1.020; no sugar nor albumen; few white blood cells and triple phosphate crystals.

BLOOD: 802 Hgb.; 5,100,000 R.B.C.; 9,000 W.B.C.; Kahn negative; R.P.M. 34; Pressure 245/118.

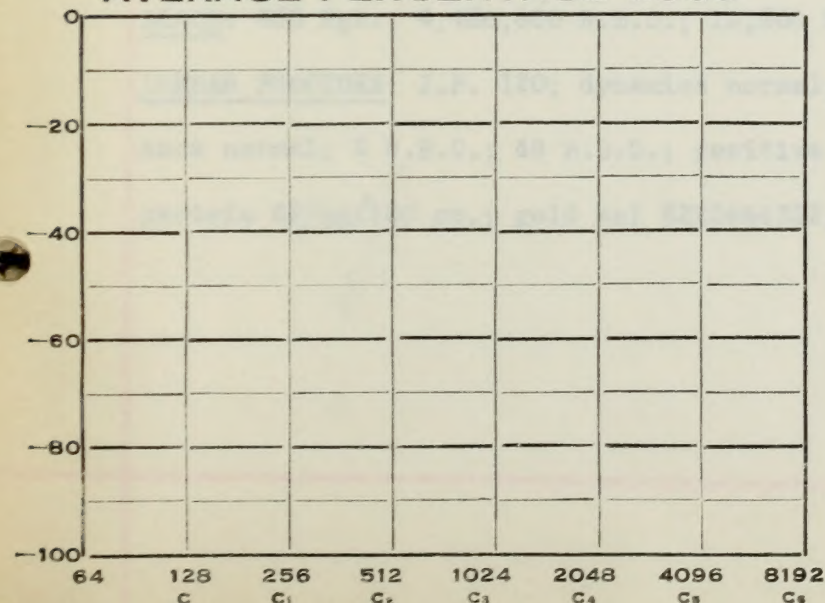
LUMBAR PUNCTURE: I.P. 130; dynamics normal; 15 cc. removed; P.P. 55; appearance normal; 1 W.B.C.; 0 poly; 0 R.B.C.; no Ross-Jones; positive Pandy; protein 30 mg/100 cc.; glob. and 0.001100000; Wassermann negative.

EVANS MEMORIAL**AUDIOGRAM**NAME N. K. 726 915
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber not Recorded*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

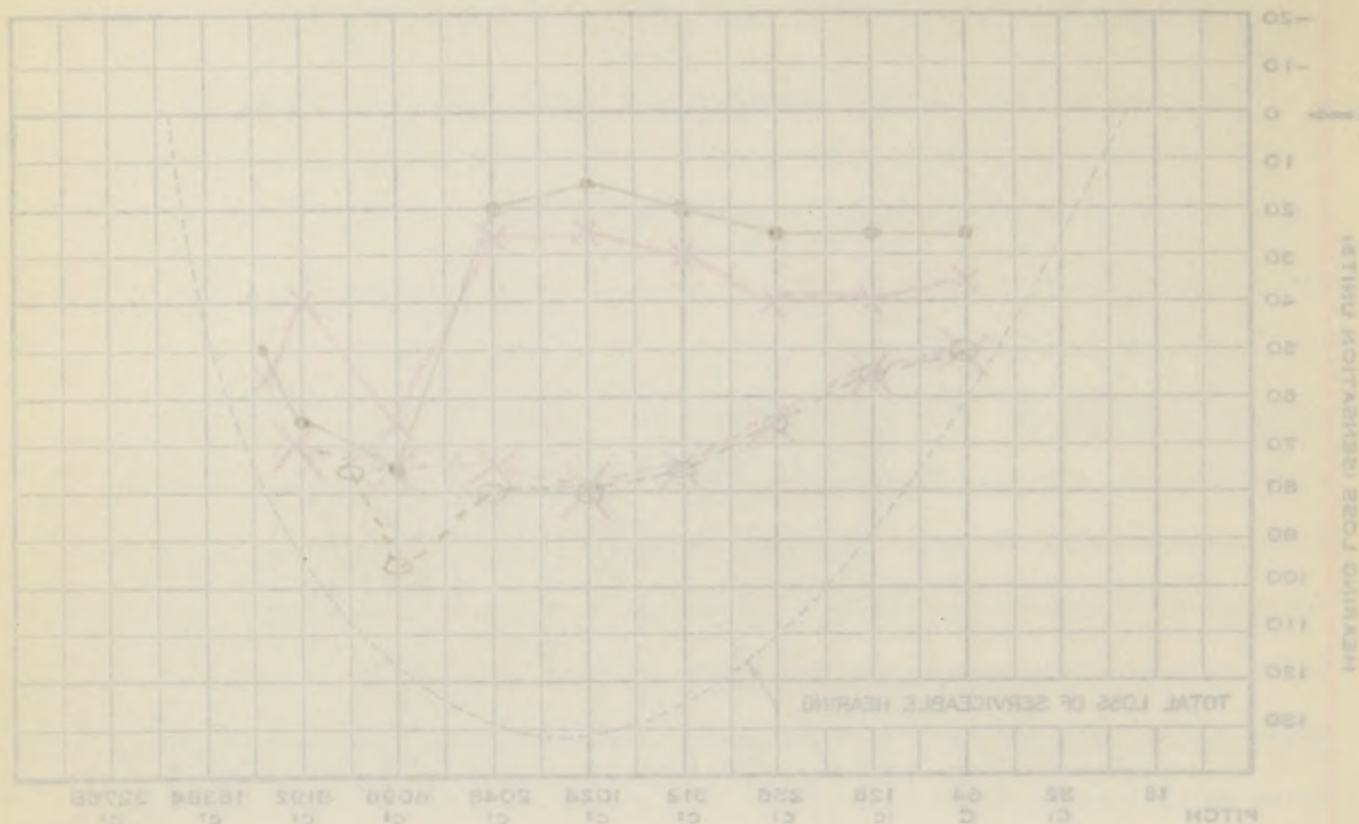
EVANS MEMORIAL

AUDIOGRAM

NAME *W. R.*
DATE

776 915

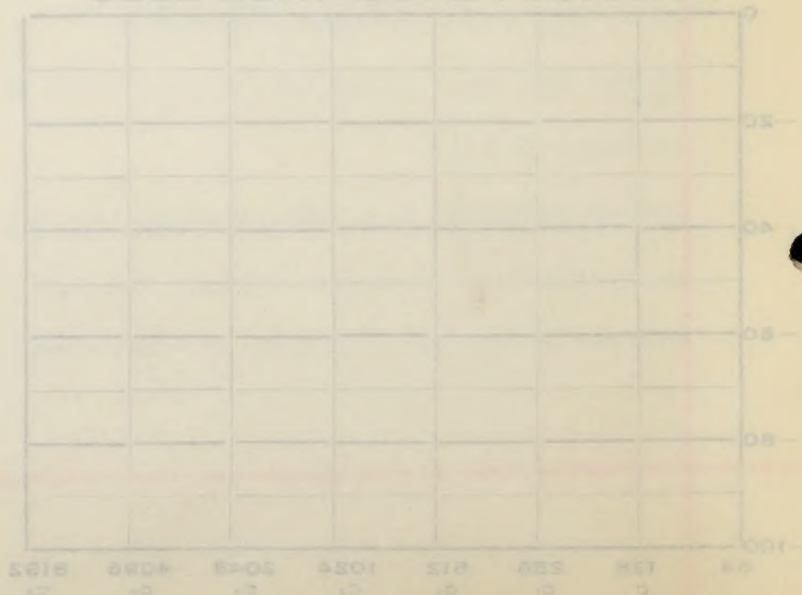
19



Frequency Hearing Loss
Right Ear
Left Ear

Weber not Recorded

AVERAGE PERCENTAGE LOSS



Right

Left

Upper Limit

Lower Limit

Whisper

Voice

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Chief Symptom

Location

Disease

N... K...; #726,915; Male; Age 52; White; Married.

DIAGNOSIS: Syphilis of the central nervous system - vascular; cerebellar thrombosis on the left.

One week before admission a marked ataxia of the left arm and leg had developed and become progressively worse. Three days after the onset he was forced to go to bed and has remained non-ambulatory since. He complained of pain about the left eye radiating to that cheek and side of nose. It is impossible to discover if previous luetic infection existed.

PHYSICAL EXAMINATION: There is a glass eye on the right, the eye having been enucleated several years ago as a result of trauma. Oral sepsis is present.

NEUROLOGICAL EXAMINATION: The patient was in a euphoric mood. There was pain over the distribution of the left fifth nerve, corneal hypaesthesia and lower facial weakness on that side. The left pupil is irregular and reacts only slightly to light. There is marked ataxia of the left leg, Gordon-Holmes rebound in the left arm, adiadokokenesia on the left and inability to carry out the finger to nose, heel to shin, or fine movements, with the left hand. Muscles of the left extremities felt weak.

URINE: Amber; acid; sp. gr. 1018; no sugar nor albumen; occasional pus and epithelial cells and oxalate crystals in sediment.

BLOOD: 85% Hgb.; 4,420,000 R.B.C.; 10,200 W.B.C.; Kahn positive; pr. 136/80.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 10 cc. removed; F.P. 50; appearance normal; 2 W.B.C.; 48 R.B.C.; positive Ross-Jones and Pandy; protein 62/mg/100 cc.; gold sol 2223444322; Wasserman strongly positive.

M... E...; 4726, 915; male; Age 32; White; married.

DIAGNOSIS: Syphilis of the central nervous system - vascular; cerebellar

thrombosis on the left.

One week before admission a marked ataxia of the left arm and leg had developed and became progressively worse. Three days after the onset he was forced to go to bed and has remained non-ambulatory since. He complained of pain about the left eye radiating to the cheek and side of nose. It is impossible to discover if previous infection existed.

PHYSICAL EXAMINATION: There is a glass eye on the right, the eye having been enucleated several years ago as a result of trauma. Oral cavity is present.

NEUROLOGICAL EXAMINATION: The patient was in a euphoric mood. There was pain over the distribution of the left fifth nerve, corneal hypoaesthesia and lower

facial weakness on that side. The left pupil is irregular and reacts only slightly to light. There is marked ataxia of the left leg, Gordon-Holmes

rebound in the left arm, adiadochokinesis on the left and inability to carry out the finger to nose, heel to shin, or line movements, with the left hand.

Muscles of the left extremities felt weak.

URINE: Amber; acid; sp. gr. 1.018; no sugar nor albumen; occasional pus and

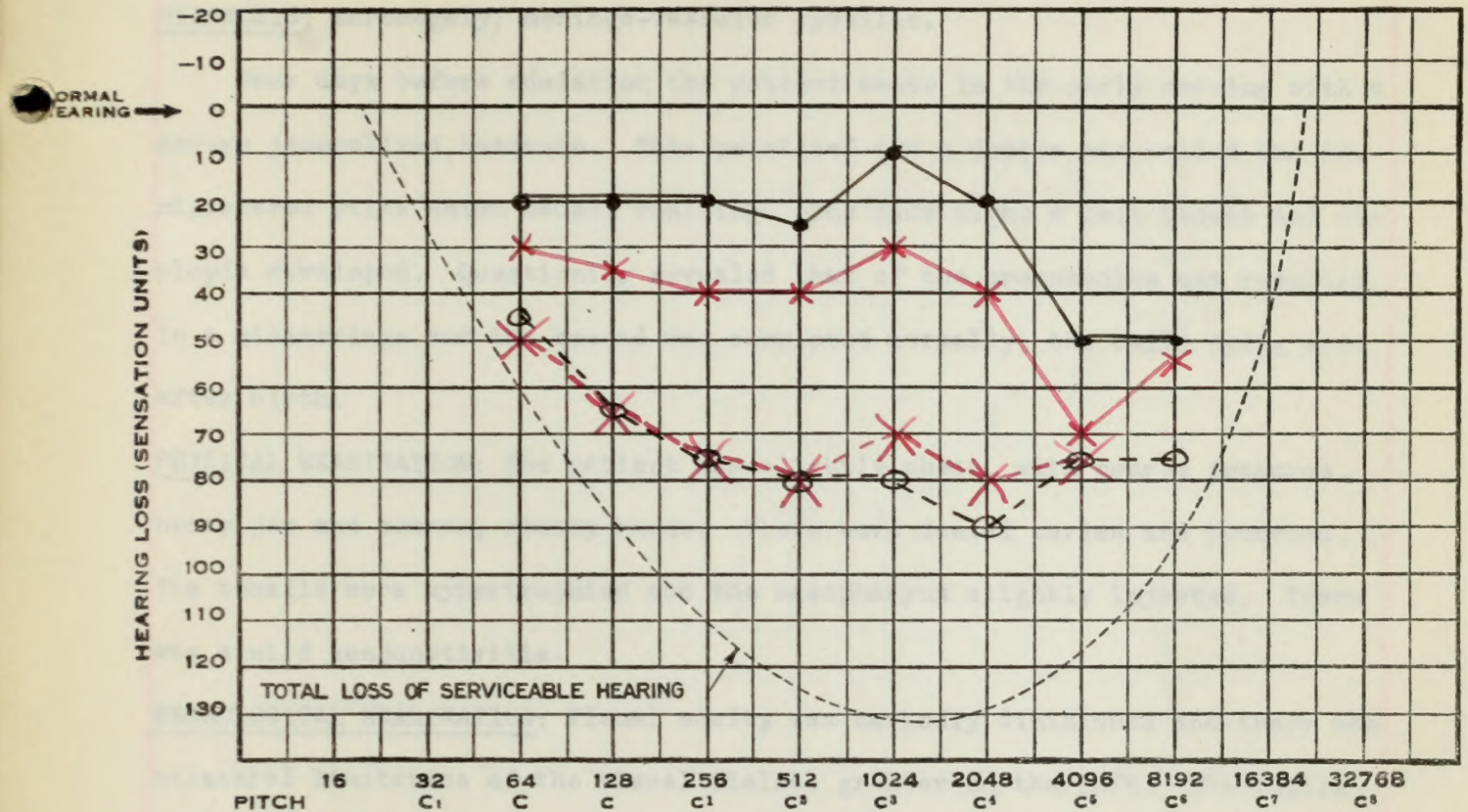
epithelial cells and occasional crystals in sediment.

BLOOD: 882 Hb.; 4,420,000 R.B.C.; 10,200 W.B.C.; Kahn positive; pr. 136/80.

LUMBAR PUNCTURE: I.P. 120; dynamics normal; 10 cc. removed; W.B. 50; appear-

ance normal; 2 W.B.C.; 48 R.B.C.; positive Ross-Jones and Pandey.

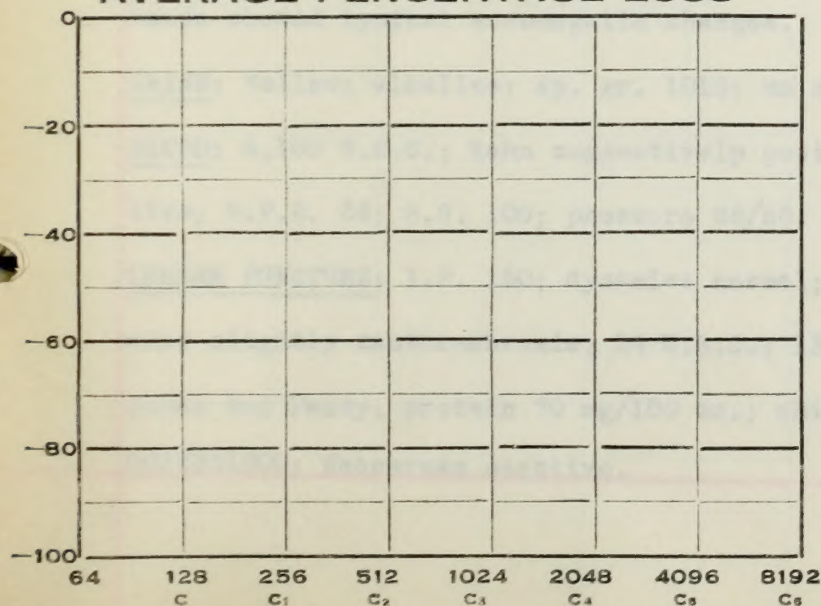
protein 82 mg/100 cc.; gold sol 2232444325; Wasserman strongly positive.

EVANS MEMORIAL**AUDIOGRAM**NAME M. D. 691595
DATE 19

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber not Recorded*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

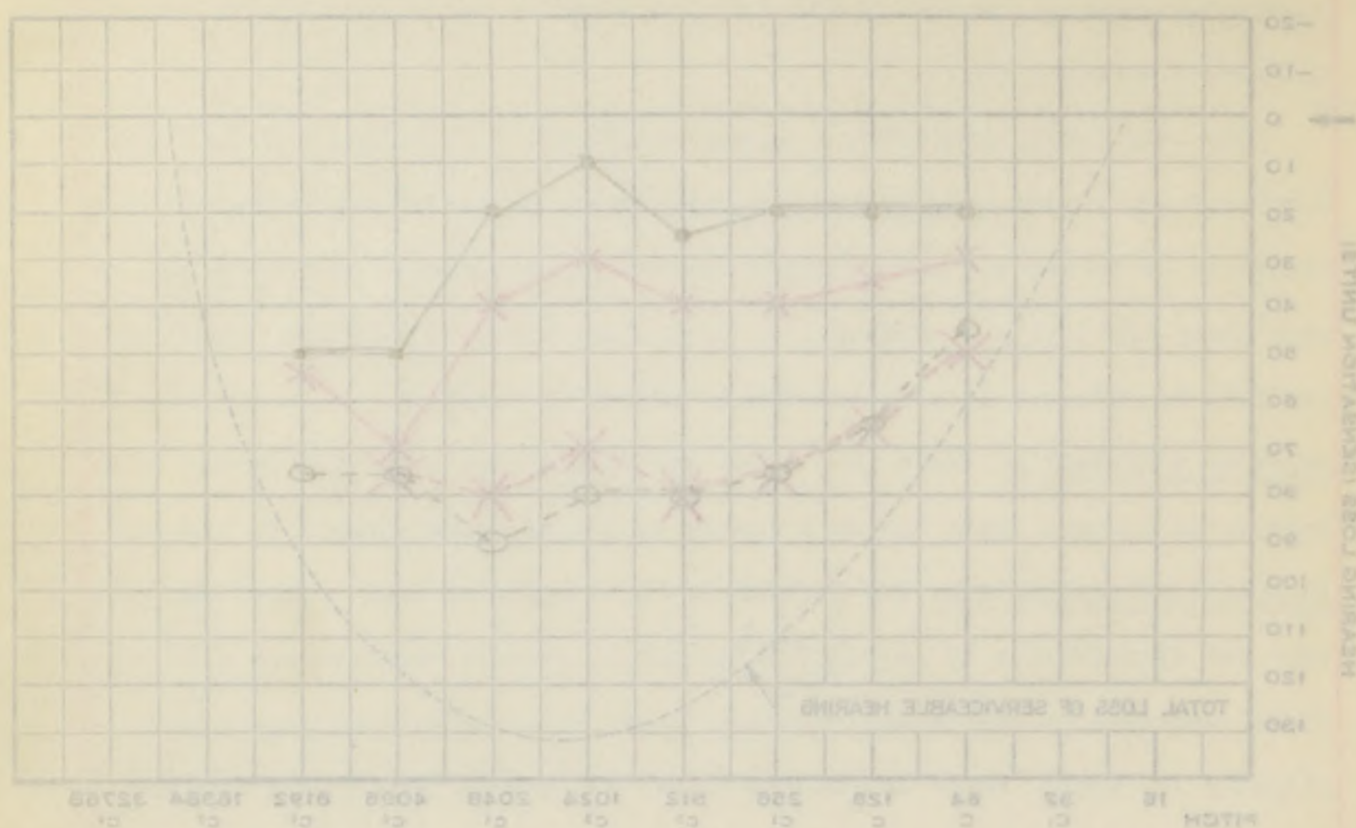
AUDIOGRAM

NAME
DATE

M.D.

691992

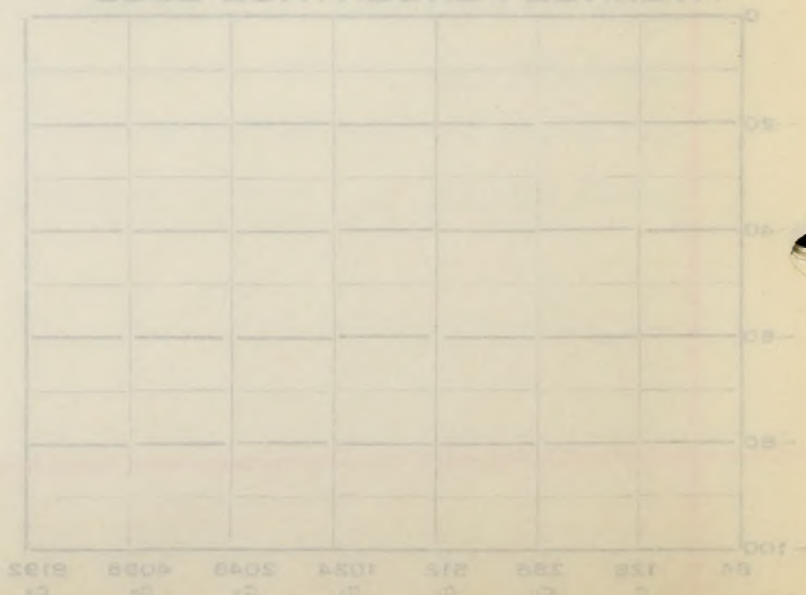
19



Percentage Hearing Loss
Right Ear
Left Ear

Weber not Recorded

AVERAGE PERCENTAGE LOSS



Right

Left

AC
Rinne
Weber
Upper Limit
Lower Limit
Whisper
Voice

Chief Symptom
1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Diagnosis
Duration

M... D...; #691,595; Female; Age 44; White; Widow.

DIAGNOSIS: Acromegaly; meningo-vascular syphilis.

Four days before admission the patient awoke in the early morning with a severe generalized headache. This persisted and a doctor was called who administered pills which caused vomiting. The next night a left ptosis and diplopia developed. Questioning revealed that of two pregnancies one resulted in a miscarriage and the second was completed normally, the child dying soon after birth.

PHYSICAL EXAMINATION: The patient was slightly obese, with coarse features, heavy jaw and coarseness, stubby hands. There were dental caries and pyorrhea. The tonsils were hypertrophied and the nasopharynx slightly injected. There was a mild conjunctivitis.

NEUROLOGICAL EXAMINATION: Visual acuity was markedly diminished and there was bilateral limitation of the visual fields, greater on the left. The pupils were irregular, with the right larger than the left which reacted only sluggishly to light and accommodation. The deep reflexes and vibration sense of the legs were diminished. There was complete ptosis of the third nerve on the left, while the right was slightly involved. X-rays of the skull showed widening of the sella turcica and of the posterior clinoids. X-rays of the hands showed typical acromegalic changes.

URINE: Yellow; alkaline; sp. gr. 1018; no sugar nor albumen.

BLOOD: 4,100 W.B.C.; Kahn suggestively positive, two subsequent tests negative; N.P.N. 26; B.S. 100; pressure 86/58.

LUMBAR PUNCTURE: I.P. 150; dynamics normal; 6 cc. removed; F.P. 95; appearance slightly xanthochromic; 54 W.B.C.; 13% polys; 10 R.B.C.; positive Ross-Jones and Pandy; protein 70 mg/100 cc.; chloride 671 mg/100 cc.; gold sol 0012331000; Wasserman negative.

... D...; 4591, 595; Female; Age 44; White; Widow.

DIAGNOSIS: Sarcosarcoma; meningio-vascular syphilis.

Four days before admission the patient awoke in the early morning with a severe generalized headache. This persisted and a doctor was called who administered pills which caused vomiting. The next night a left phosia and diplopia developed. Questioning revealed that of two pregnancies one resulted in a miscarriage and the second was completed normally, the child dying soon after birth.

PHYSICAL EXAMINATION: The patient was slightly obese, with coarse features, heavy jaw and coarse, stubby hands. There were dental caries and pyorrhea. The tonsils were hypertrophied and the nasopharynx slightly injected. There was a mild conjunctivitis.

NEUROLOGICAL EXAMINATION: Visual acuity was markedly diminished and there was bilateral limitation of the visual fields, greater on the left. The pupils were irregular, with the right larger than the left which reacted only sluggishly to light and accommodation. The deep reflexes and vibration sense of the legs were diminished. There was complete palsy of the third nerve on the left, while the right was slightly involved. X-rays of the skull showed widening of the sella turcica and of the posterior clinoids. X-rays of the hands showed typical arteriographic changes.

URINE: Yellow; alkaline; sp. gr. 1.018; no sugar nor albumen.

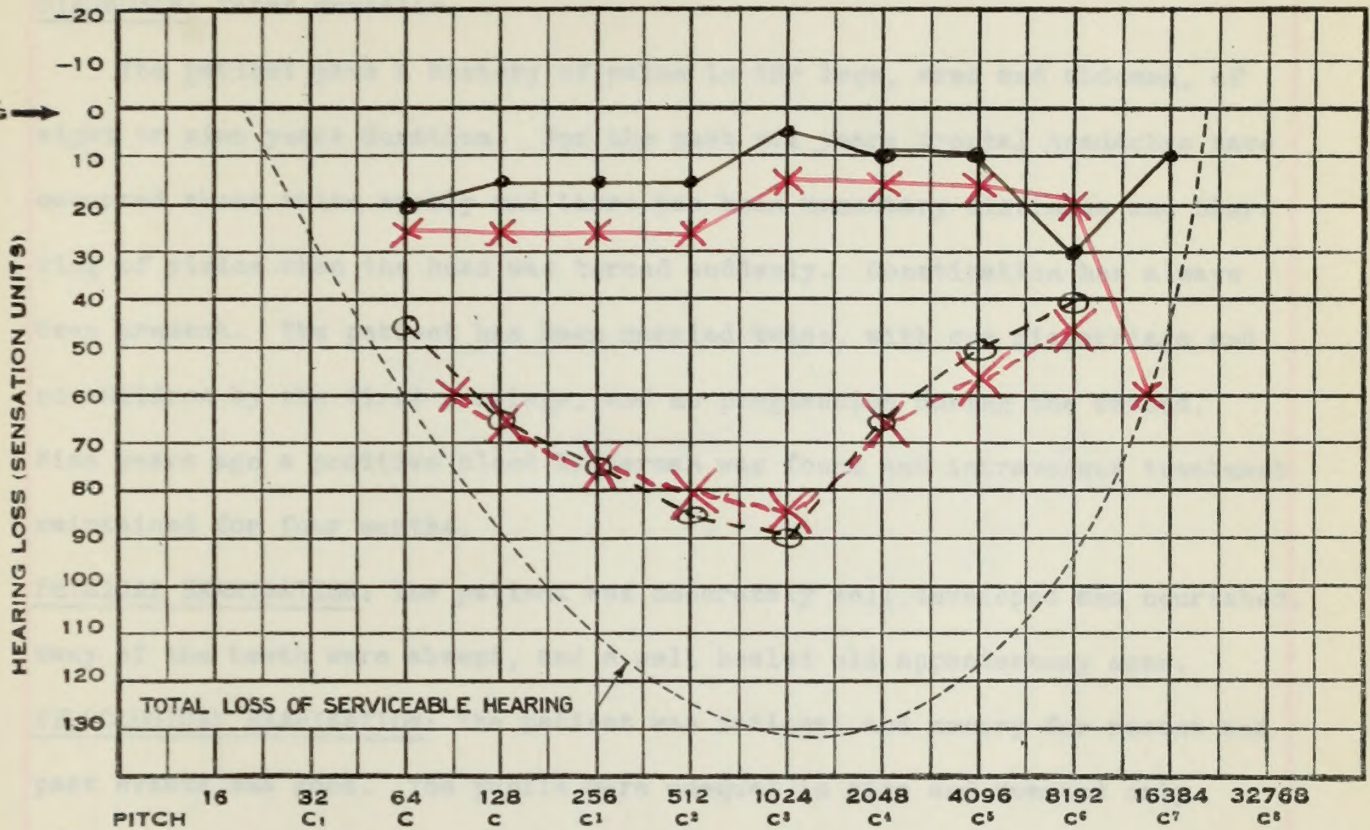
BLOOD: 4,100 W.B.C.; Kahn suggestively positive, two subsequent tests negative; W.P.R. 25; H.S. 100; pressure 86/58.

LABORATORY: I.F. 150; Gyanase normal; 5 cc. removal; 2 P. 85; appearance slightly xanthochromic; 84 W.B.C.; 134 polys; 10 R.B.C.; positive Wasserman and Kahn; protein 70 mg/100 cc.; chloride 571 mg/100 cc.; gold sol.

COLLECTION: Negative.

EVANS MEMORIAL**AUDIOGRAM**NAME E. H. 741869

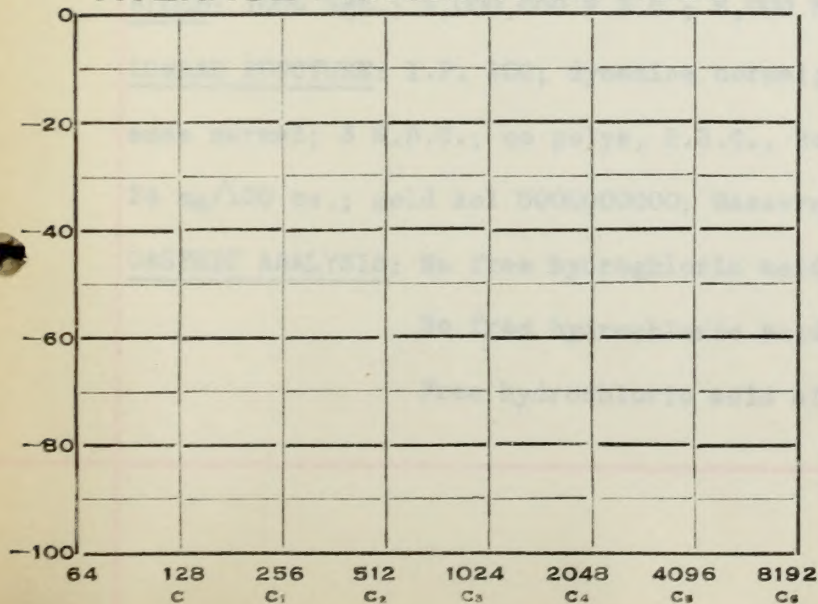
DATE..... 19.....



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber = at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeftRinne ^{AC}_{BC}

Weber

Upper Limit

Lower Limit

Whisper

Voice

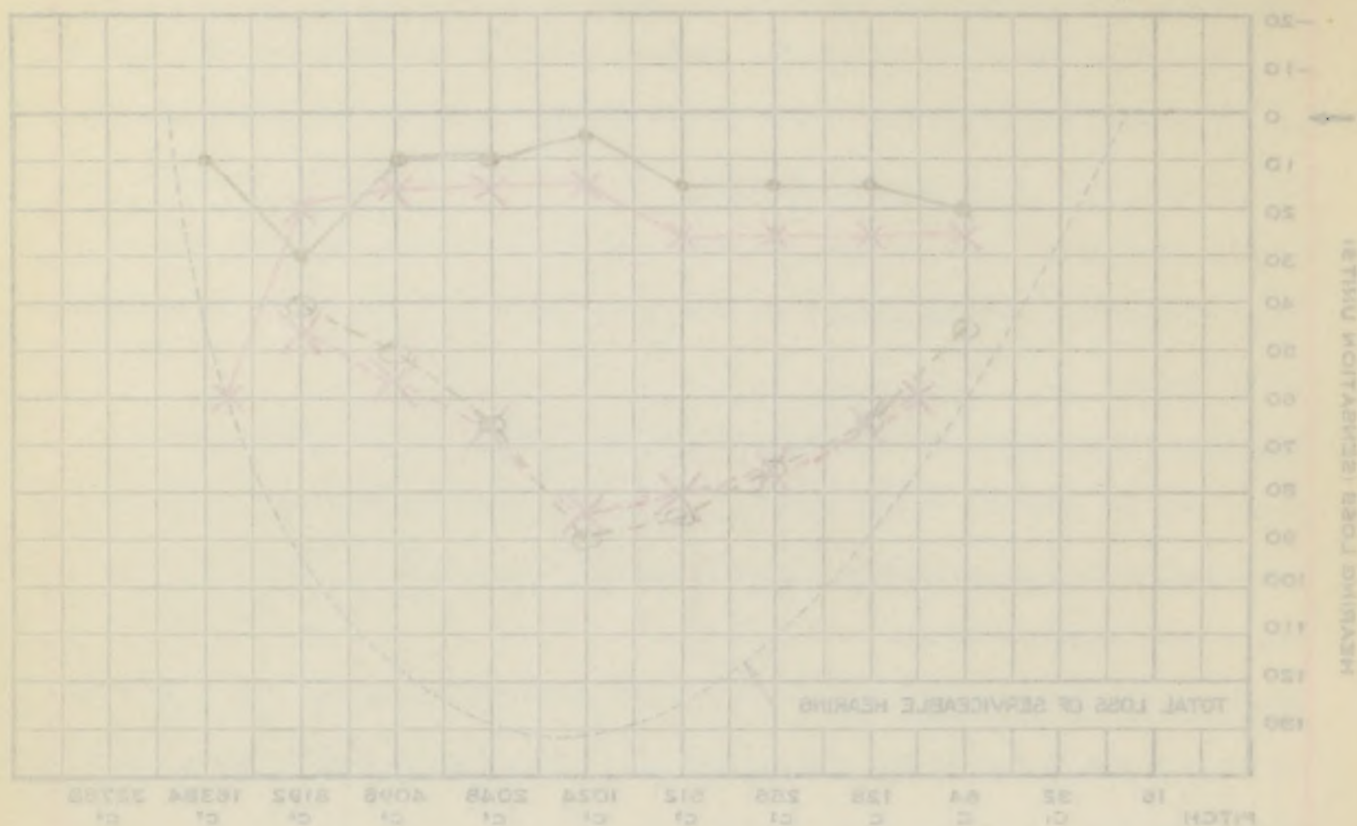
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

E. H.

741569

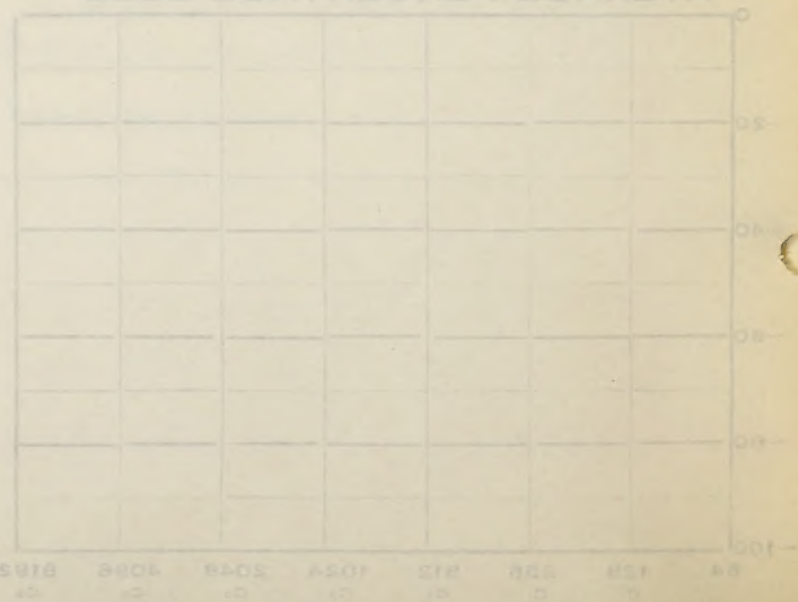


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber = at 4 points

Disease
 Duration
 Chief Symptom
 1. Deafness
 2. Pain
 3. Discharge
 4. Tinnitus
 5. Headache
 6. Dizziness
 Right
 Left
 Rinne
 Weber
 Upper Limb
 Lower Limb
 Vision
 Voice

E...H...; #741,869; Male; Age 37; White; Married.

DIAGNOSIS: Tabes dorsalis.

The patient gave a history of pains in the legs, arms and abdomen, of eight or nine years duration. For the past six years frontal headaches have occurred about twice weekly and there has been momentary dizziness and blurring of vision when the head was turned suddenly. Constipation has always been present. The patient has been married twice, with one miscarriage and no children by the first marriage, and no pregnancies during the second. Nine years ago a positive blood Wasserman was found and intravenous treatment maintained for four months.

PHYSICAL EXAMINATION: The patient was moderately well developed and nourished. Many of the teeth were absent, and a well healed old appendectomy scar.

NEUROLOGICAL EXAMINATION: The patient was rational and memory for recent and past events was good. The pupils were unequal in size and reacted only slightly to light but fairly well to accommodation. The extended tongue showed a coarse tremor. The deep tendon reflexes of the lower extremities were absent in all positions, with a reduced plantar response bilaterally.

URINE: Amber; acid; cloudy; sp. gr. 1020; no sugar nor albumen; a few epithelial cells in the sediment.

BLOOD: 100% Hgb.; 5,000,000 R.B.C.; 6,000 WBC; Kahn negative; pr. 118/78.

LUMBAR PUNCTURE: I.P. 100; dynamics normal; 15 cc. removed; F.P. 50; appearance normal; 3 W.B.C.; no polys, R.B.C., Ross-Jones nor Pandy; protein 24 mg/100 cc.; gold sol 0000000000; Wasserman negative.

GASTRIC ANALYSIS: No free hydrochloric acid when fasting,

No free hydrochloric acid after alcohol test meal,

Free hydrochloric acid after 1/10 mg. histamine.

...H...; 7'2 1/2, 180; Male; Age 37; White; Married.

DIAGNOSIS: Tabes dorsalis.

The patient gave a history of pain in the legs, arms and abdomen, of slight or nine years duration. For the past six years frontal headaches have occurred about twice weekly and there has been momentary blindness and blurring of vision when the head was turned suddenly. Constipation has always been present. The patient has been married twice, with one miscarriage and no children by the first marriage, and no pregnancies during the second. Nine years ago a positive blood Wassermann was found and intravenous treatment maintained for four months.

PHYSICAL EXAMINATION: The patient was moderately well developed and nourished. Any of the teeth were absent, and a well healed old appendectomy scar.

NEUROLOGICAL EXAMINATION: The patient was rational and memory for recent and past events was good. The pupils were unequal in size and reacted only slightly to light but fairly well to accommodation. The extended tongue showed a coarse tremor. The deep tendon reflexes of the lower extremities were absent in all positions, with a reduced plantar response bilaterally.

URINE: Amber; acid; cloudy; sp. gr. 1.020; no sugar nor albumen; a few epithelial cells in the sediment.

BLOOD: 100% Hb.; 5,000,000 R.B.C.; 5,000 WBC; Kahn negative; ur. 118/75.

URINARY FUNCTION: I.P. 100; 45 minutes normal; 15 cc. removed; R.R. 20; expect-

ation normal; S.W.R.C.; no poys., R.B.C., Ross-Jones not found; protein

24 mg/100 cc.; Gold sol 0000000000; Wassermann negative.

GASTRIC ANALYSIS: No free hydrochloric acid when fasting.

No free hydrochloric acid after alcohol test meal.

Free hydrochloric acid after 1/10 mg. histamine.

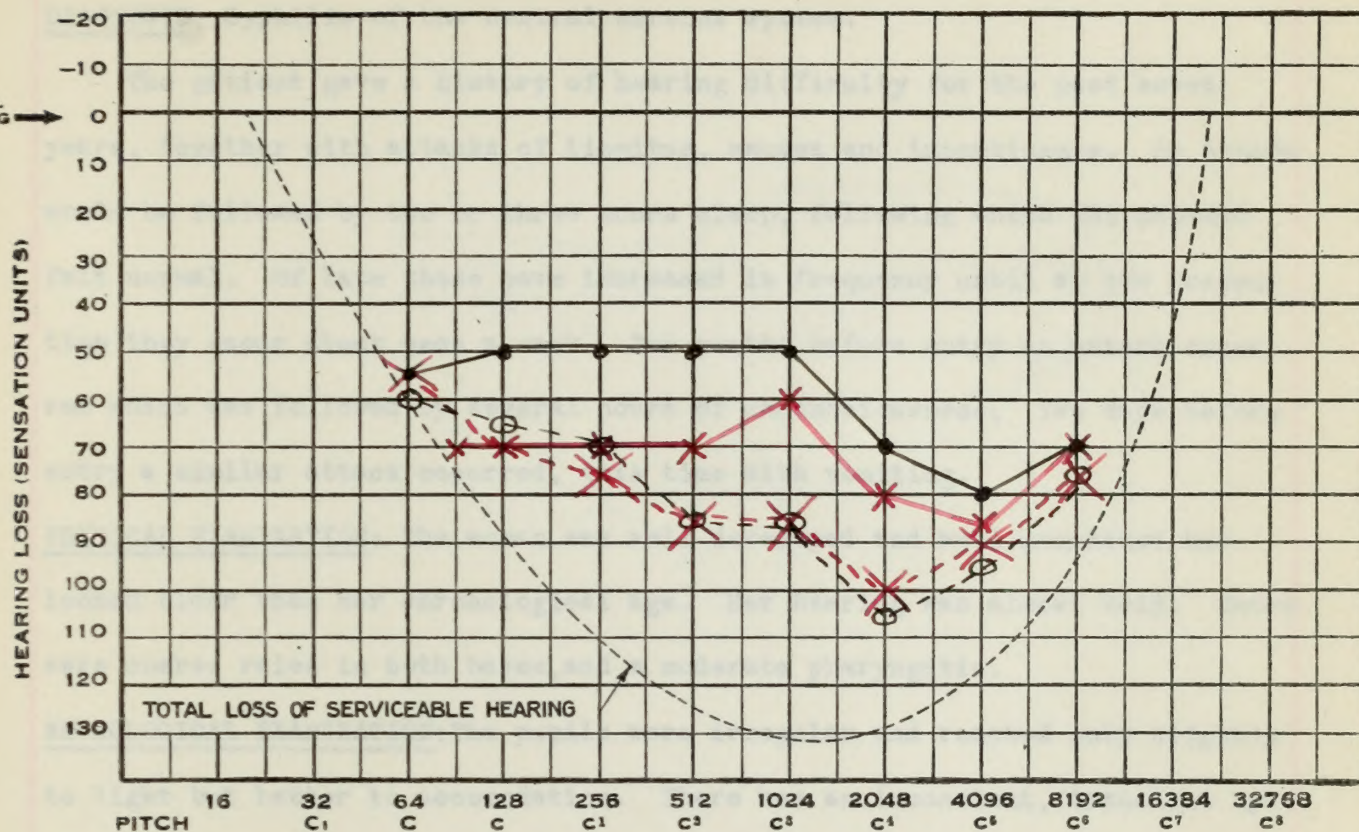
EVANS MEMORIAL**AUDIOGRAM**

NAME

*M.B.**697170*

DATE

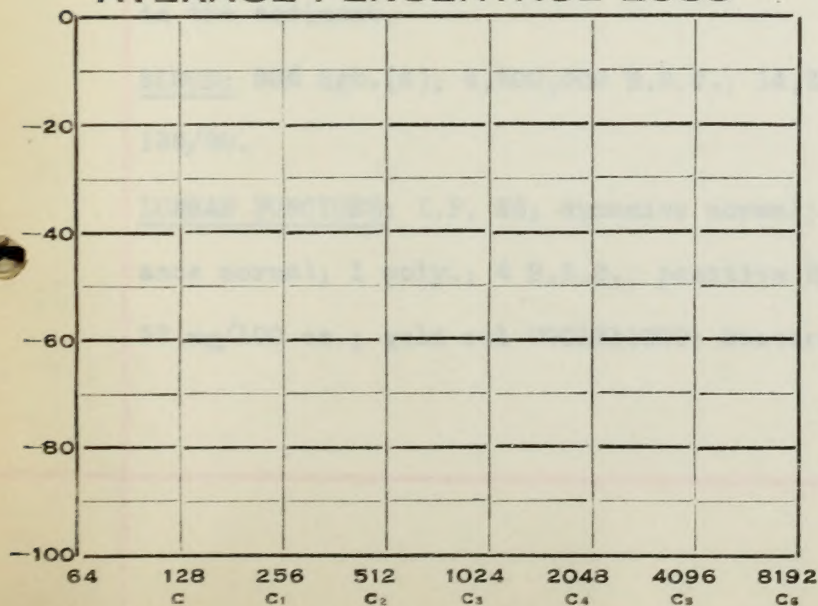
19



Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber not Recorded*

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

AUDIOGRAM

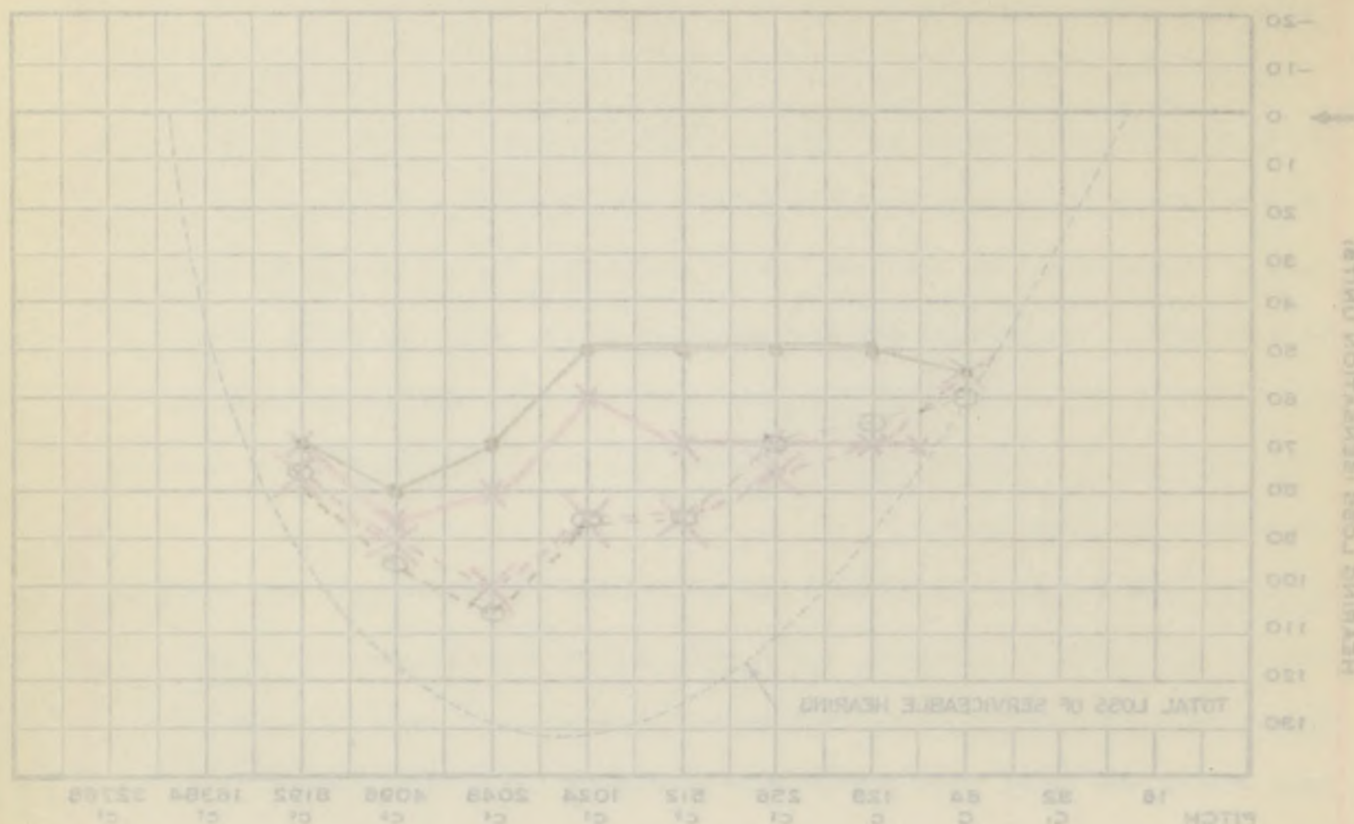
697170

M.B.

NAME

DATE

10

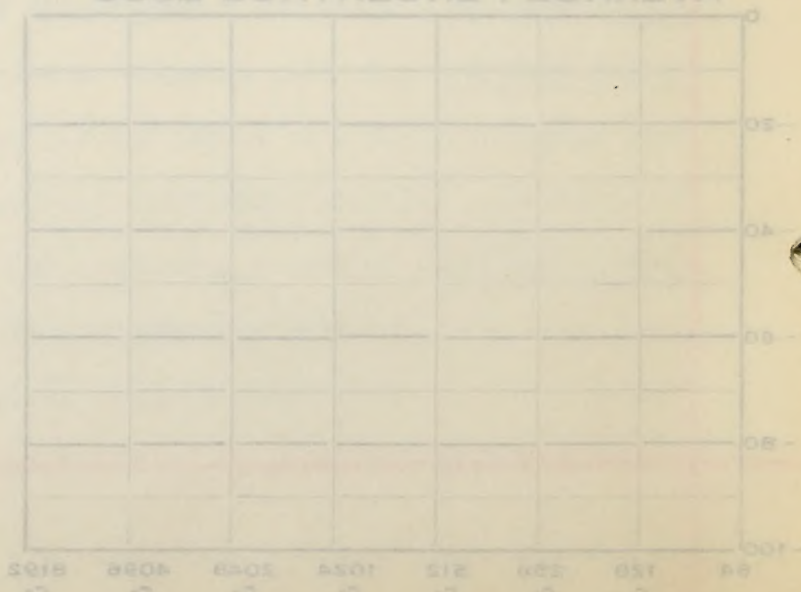


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber not recorded

- Diagnosis
- Duration
- Chief Complaints
1. Deafness
 2. Pain
 3. Discharge
 4. Tinnitus
 5. Headache
 6. Dizziness

Left

Right

Rinne AC

Wedge BC

Upper Limit

Lower Limit

Whisper

Voice

M... B...; #697,170; Female; Age 64; White; Married.

DIAGNOSIS: Syphilis of the central nervous system.

The patient gave a history of hearing difficulty for the past seven years, together with attacks of tinnitus, nausea and incontinence. An attack would be followed by two or three hours sleep, following which the patient felt normal. Of late these have increased in frequency until at the present time they occur about once a week. Two months before entry an attack occurred which was followed by several hours of unconsciousness. Two days before entry a similar attack occurred, this time with vomiting.

PHYSICAL EXAMINATION: The woman was well developed and well nourished but looked older than her chronological age. Her hearing was almost void. There were coarse rales in both bases, and a moderate pharyngitis.

NEUROLOGICAL EXAMINATION: The pupils were irregular and reacted only slightly to light but better to accommodation. There was an inconstant, transient nystagmus. Air conduction was extremely lowered. All the deep reflexes were hyperactive, with the left greater than the right. There was a bilateral Babinski and a positive Chaddock on the left, while the strength of both legs was markedly diminished. Incontinence lasted a few days after entry.

URINE: Yellow; alkaline; sp. gr. 1013; no sugar nor albumen; 8 to 12 W.B.C. in the sediment.

BLOOD: 80% Hgb.(S); 5,500,000 R.B.C.; 14,200 W.B.C.; Kahn positive; pressure 138/90.

LUMBAR PUNCTURE: I.P. 85; dynamics normal; 12 cc. removed; F.P. 0; appearance normal; 1 poly.; 4 R.B.C.; positive Ross-Jones and Pandy; protein 37 mg/100 cc.; gold sol 0001211000; Wasserman positive.

H... H...; 4587, IV; Female; Age 54; White; Married.

DIAGNOSIS: Syphilis of the central nervous system.

The patient gave a history of hearing difficulty for the past seven years, together with attacks of dizziness, nausea and incontinence. An attack would be followed by two or three hours sleep, following which the patient felt normal. Of late there have been increased frequency until at the present time they occur about once a week. Two months before entry an attack occurred which was followed by several hours of unconsciousness. Two days before entry a similar attack occurred, this time with vomiting.

PHYSICAL EXAMINATION: The woman was well developed and well nourished but looked older than her chronological age. Her hearing was almost void. There were coarse veins in both hands, and a moderate pharyngitis.

NEUROLOGICAL EXAMINATION: The pupils were irregular and reacted only slightly to light but better to accommodation. There was an inconstant, transient nystagmus. Air conduction was extremely lowered. All the deep reflexes were hyperactive, with the left greater than the right. There was a bilateral Babinski and a positive Chaddock on the left, while the strength of both legs was markedly diminished. Incontinence lasted a few days after entry.

URINE: Yellow; alkaline; sp. gr. 1.015; no sugar nor albumen; 8 to 12 W.B.C. in the sediment.

BLOOD: 802 Hgb. (S); 5,500,000 R.B.C.; 14,200 W.B.C.; Kahn positive; pressure 155/90.

LUMBAR PUNCTURE: I.P. 85; dynamics normal; 12 cc. removed; N.P. 0; appear-

ance normal; 1 poly.; 4 R.B.C.; positive Rose-Jones and Pandy; protein

37 mg/100 cc.; gold sol 000211000; Wasserman positive.

EVANS MEMORIAL

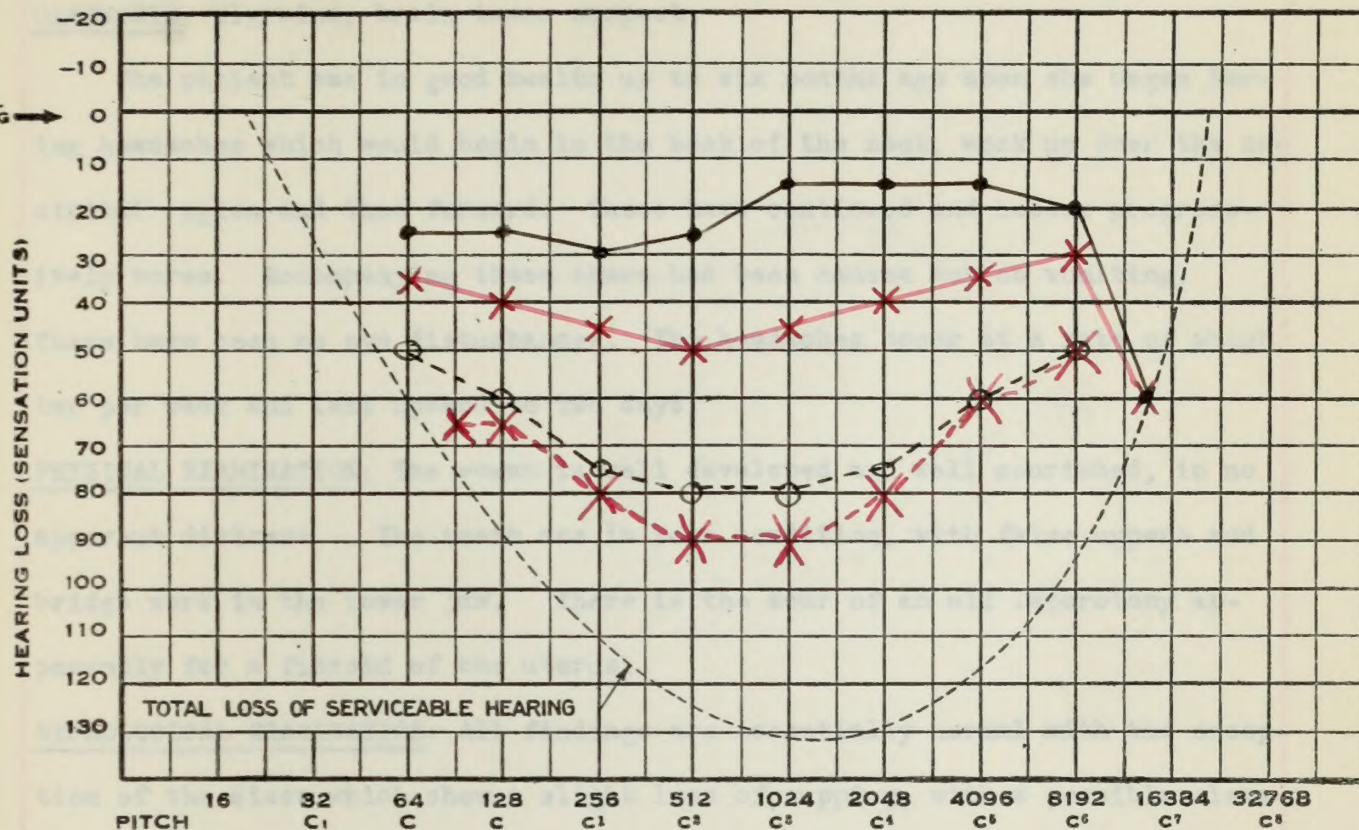
AUDIOGRAM

NAME

R.C. 745382

DATE

19

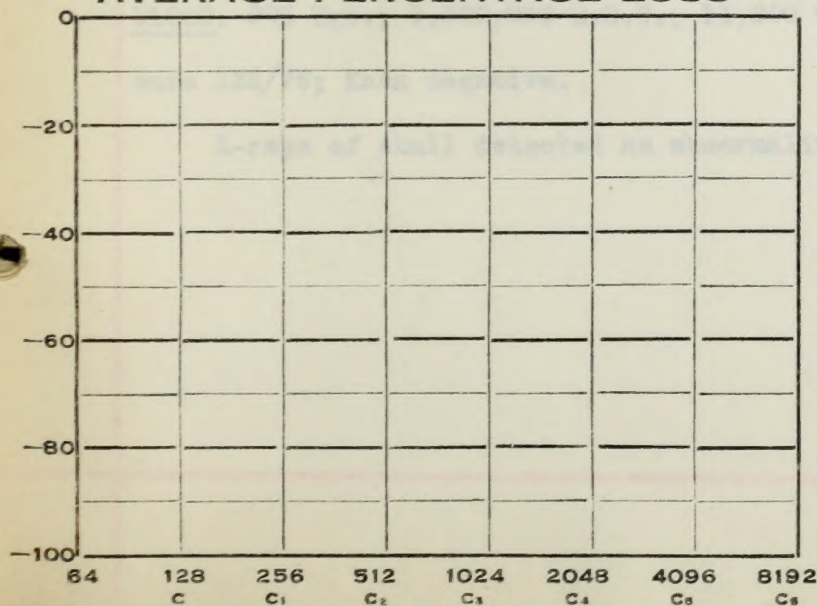


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber Right at { Vertex
Forehead
= at { Nose bridge
Chin

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right

Left

Rinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

EVANS MEMORIAL

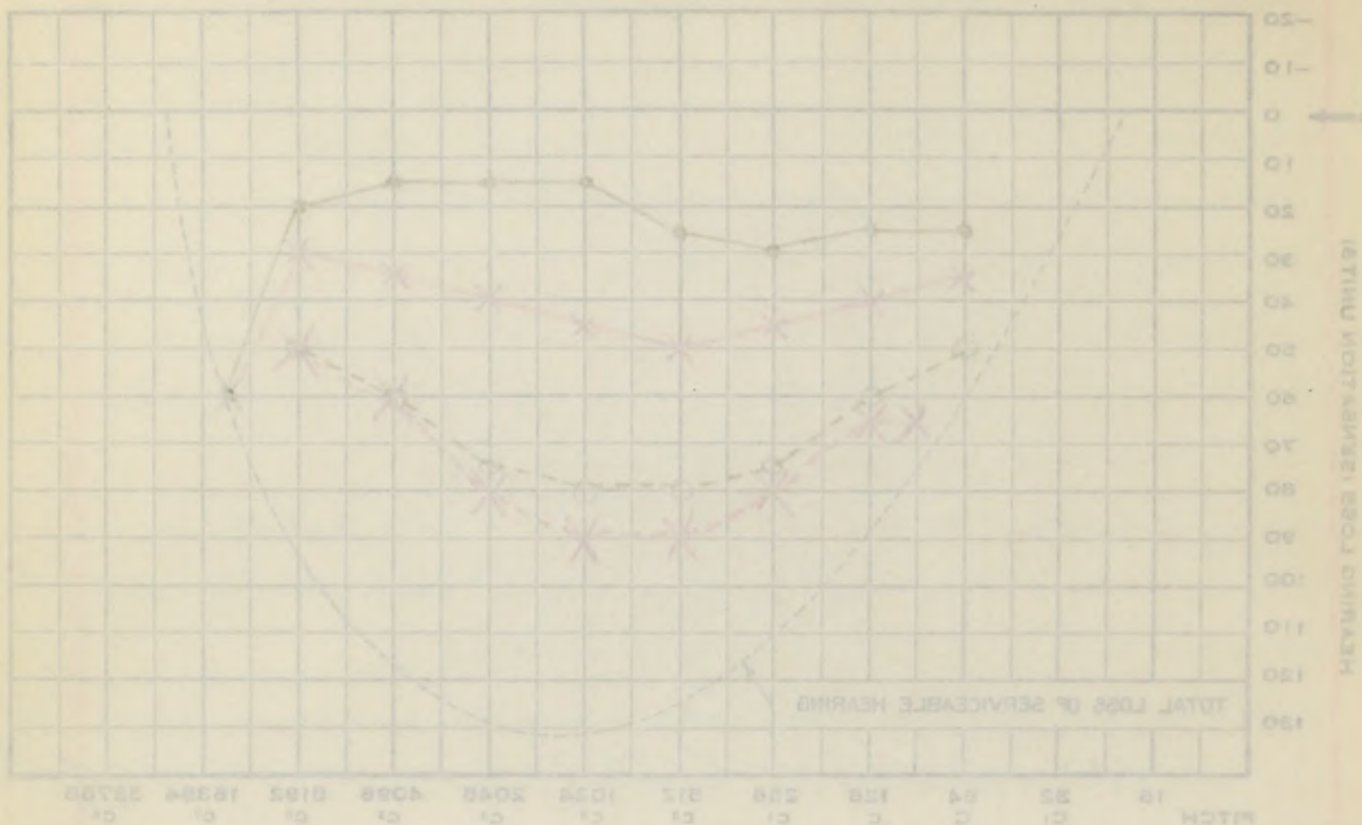
742382

R.C.

NAME

DATE

AUDIOGRAM

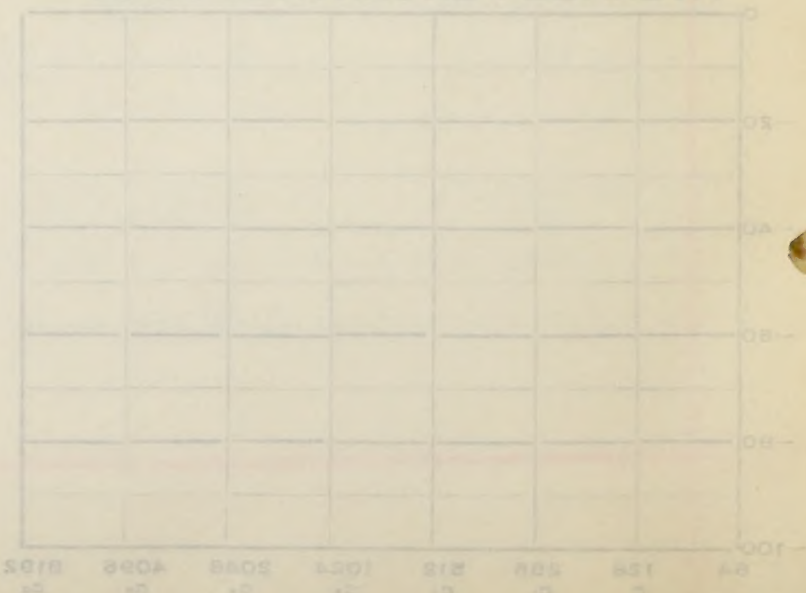


Frequency Range: 128 to 8192 Hz

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS



Weber Right at forehead
= at nose bridge
Chin

Left

Right

Right

Left

Upper Limb

Lower Limb

Vibration

Speech

Voice

R...C...; #745,382; Female; Age 47; White; Married.

DIAGNOSIS: Migraine; brain tumor suspect.

The patient was in good health up to six months ago when she began having headaches which would begin in the back of the neck, work up over the occipital region and then forward. These have continued and become progressively worse. Accompanying these there has been nausea but no vomiting. There have been no eye disturbances. The headaches occur at a rate of about two per week and last upward to two days.

PHYSICAL EXAMINATION: The woman is well developed and well nourished, in no apparent distress. The teeth are in poor condition, with false uppers and bridge work in the lower jaw. There is the scar of an old laparotomy apparently for a fibroid of the uterus.

NEUROLOGICAL EXAMINATION: All findings are essentially normal with the exception of the discs which show a slight loss of cupping, with a possible elevation and a blurring on the left side.

LUMBAR PUNCTURE: I.P. 175; dynamics normal; 15 cc. removed; F.P. 120; appearance normal; 2 W.B.C.; 0 polys, R.B.C., Ross-Jones nor Pandy; protein 14 mg/100 cc.; gold sol 0000000000; Wasserman negative.

URINE: Amber; acid; sp. gr. 1006; no sugar nor albumen.

BLOOD: 90% Hgb.; 5,000,000 R.B.C.; 11,800 W.B.C.; N.P.N. 27; B.S. 86; pressure 132/76; Kahn negative.

X-rays of skull detected no abnormalities present.

H.C.: 4745, 585; Female; Age 47; White; Married.

DIAGNOSIS: Migraine; brain tumor suspected.

The patient was in good health up to six months ago when she began having headaches which would begin in the back of the neck, work up over the occipital region and then forward. These have continued and become progressively worse. Accompanying these there has been nausea but no vomiting. There have been no eye disturbances. The headaches occur at a rate of about two per week and last upward to two days.

PHYSICAL EXAMINATION: The woman is well developed and well nourished, in no apparent distress. The teeth are in poor condition, with false uppers and bridge work in the lower jaw. There is the scar of an old laparotomy apparently for a fibroid of the uterus.

NEUROLOGICAL EXAMINATION: All findings are essentially normal with the exception of the discs which show a slight loss of cupping, with a possible elevation and a blurring on the left side.

LUMBAR PUNCTURE: I.P. 175; dynamics normal; 15 cc. removed; S.P. 120; appearance normal; S.W.B.C.: 6 polya, R.B.C., Ross-Jones nor Pandya; protein

14 mg/100 cc.; Gold sol 0000000000; Wasserman negative.

URINE: Amber; acid; sp. gr. 1.006; no sugar nor albumen.

BLOOD: 90% Hgb.; 5,000,000 R.B.C.; 11,800 W.B.C.; W.P.M. 27; S.E. 66; pres-

sure 132/76; Kahn negative.

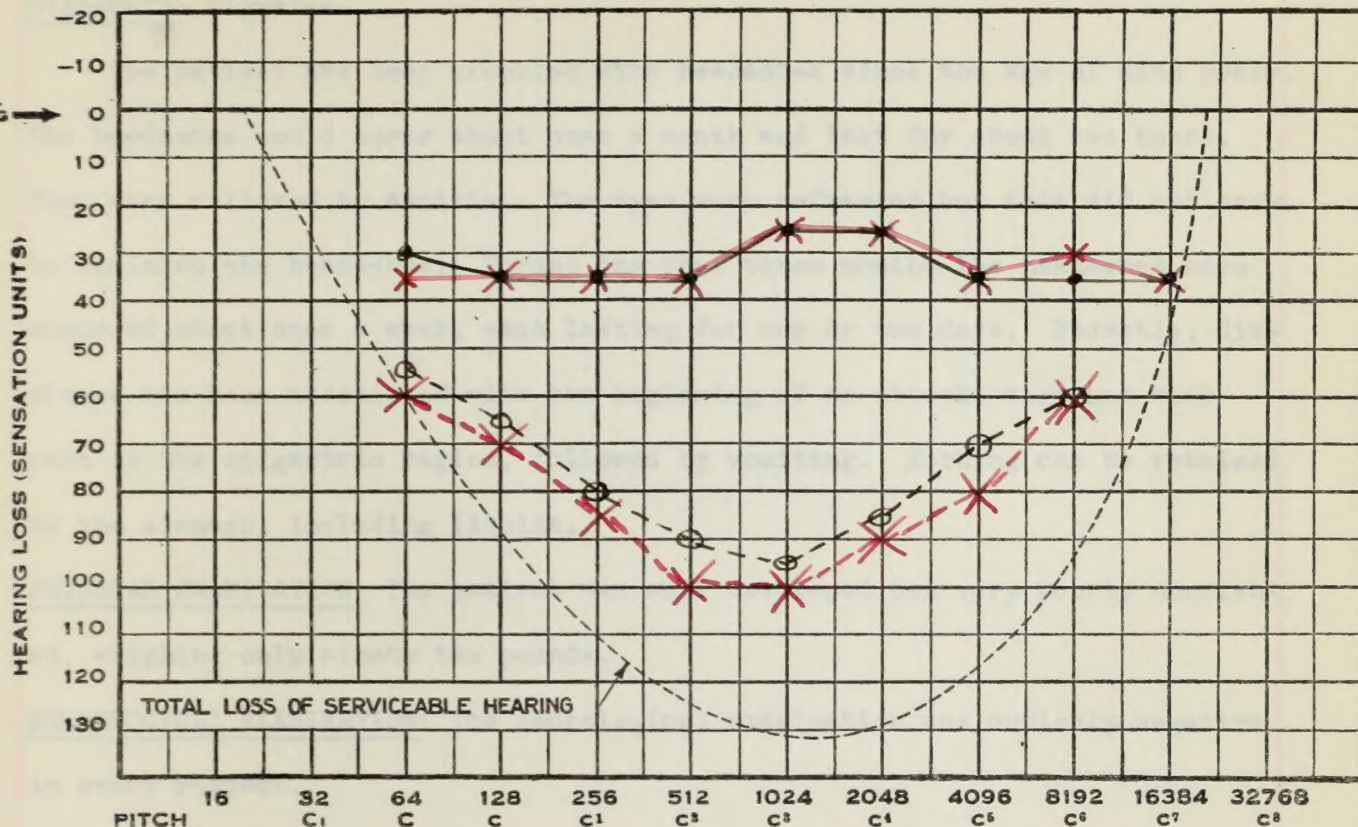
X-rays of skull detected no abnormalities present.

EVANS MEMORIAL

AUDIOGRAM

NAME L.B. 742541

DATE..... 19.....

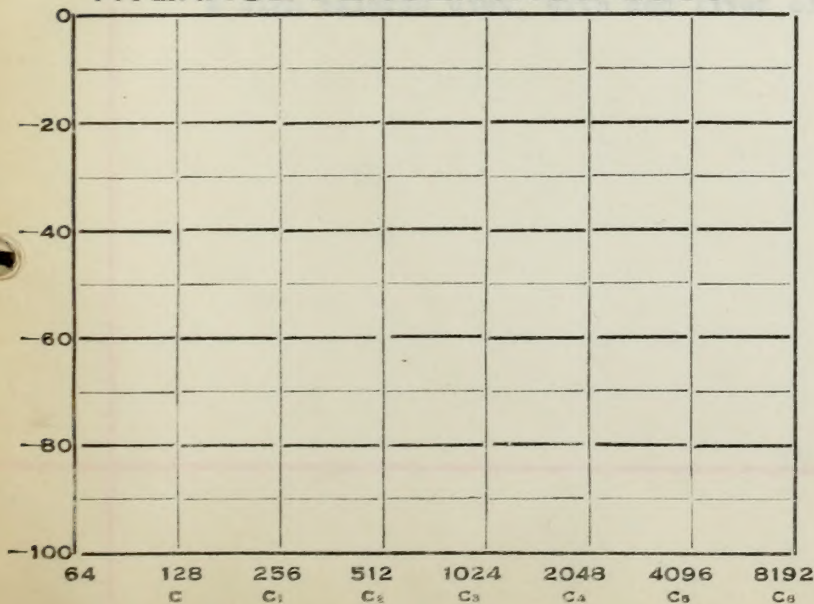


Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS

*Weber Left at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

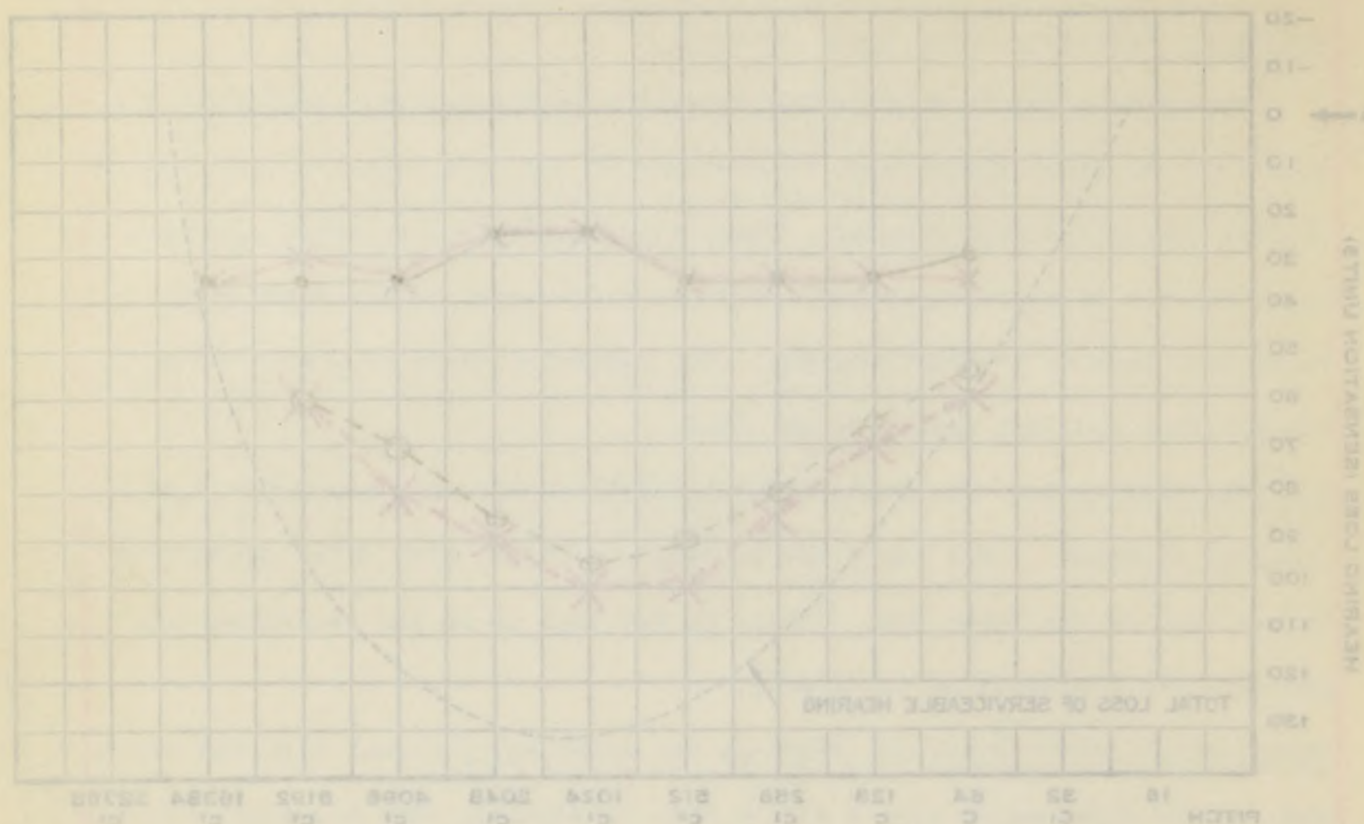
EVANS MEMORIAL

AUDIOGRAM

NAME K.B.

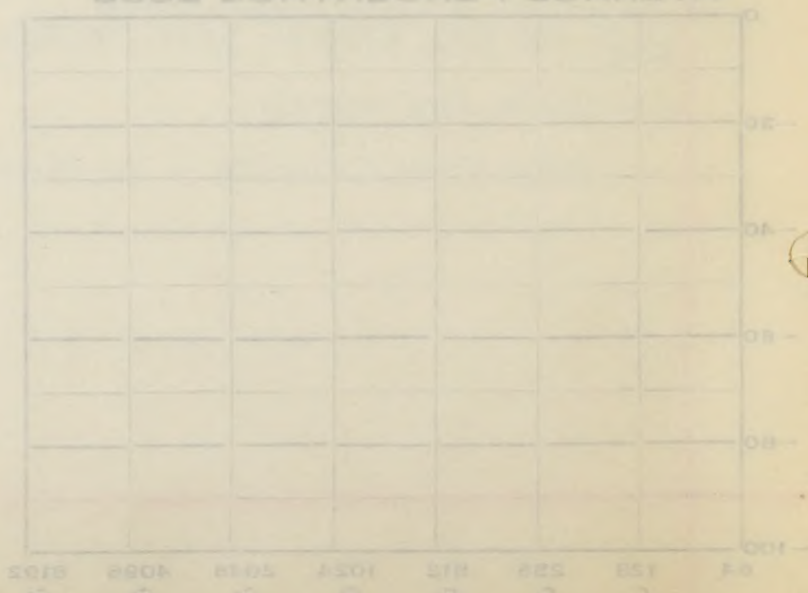
DATE 7-2-41

10



Previous finding: Left Ear, Right Ear

AVERAGE PERCENTAGE LOSS



Weber Left at 4 points

History
 Duration
 Chief Symptom
 1. Tinnitus
 2. Pain
 3. Discharge
 4. Tinnitus
 5. Headache
 6. Dizziness
 Right
 Rinne AC
 Weber
 Upper Limb
 Lower Limb
 Vision
 Vision

L... B...; #742,541; Female; Age 26; White; Single.

DIAGNOSIS: Migraine.

The patient has been troubled with headaches since the age of nine years. The headaches would occur about once a month and last for about two hours. They were relieved by aspirin. The eyes were refracted but this did not seem to diminish the headaches. During the past three months the headaches have occurred about once a week, each lasting for one or two days. Recently, dizziness has been associated with the beginning of an attack, together with pain in the epigastric region, followed by vomiting. Nothing can be retained in the stomach, including liquids.

PHYSICAL EXAMINATION: The patient was well developed but very poorly nourished, weighing only ninety two pounds.

NEUROLOGICAL EXAMINATION: The neurological examination was entirely negative in every respect.

URINE: Yellow; cloudy; alkaline; sp. gr. 1015; no sugar nor albumen; occasional white blood cells in the sediment.

BLOOD: 75% Hgb.; 3,800,000 R.B.C.; 5,900 W.B.C.; Kahn negative; pr. 110/68.

LUMBAR PUNCTURE: Not done.

Stereo chest plates were taken which showed the lung fields clear.

A high caloric diet, with cod liver oil, was established.

L... B...; 4742, 541; Female; Age 28; White; Single.

DIAGNOSIS: Migraine.

The patient has been troubled with headaches since the age of nine years. The headaches would occur about once a month and last for about two hours. They were relieved by aspirin. The eyes were retracted but this did not seem to diminish the headaches. During the past three months the headaches have occurred about once a week, each lasting for one or two days. Recently, dizziness has been associated with the beginning of an attack, together with pain in the epigastric region, followed by vomiting. Nothing can be retained in the stomach, including liquids.

PHYSICAL EXAMINATION: The patient was well developed but very poorly nourished, weighing only ninety-two pounds.

NEUROLOGICAL EXAMINATION: The neurological examination was entirely negative in every respect.

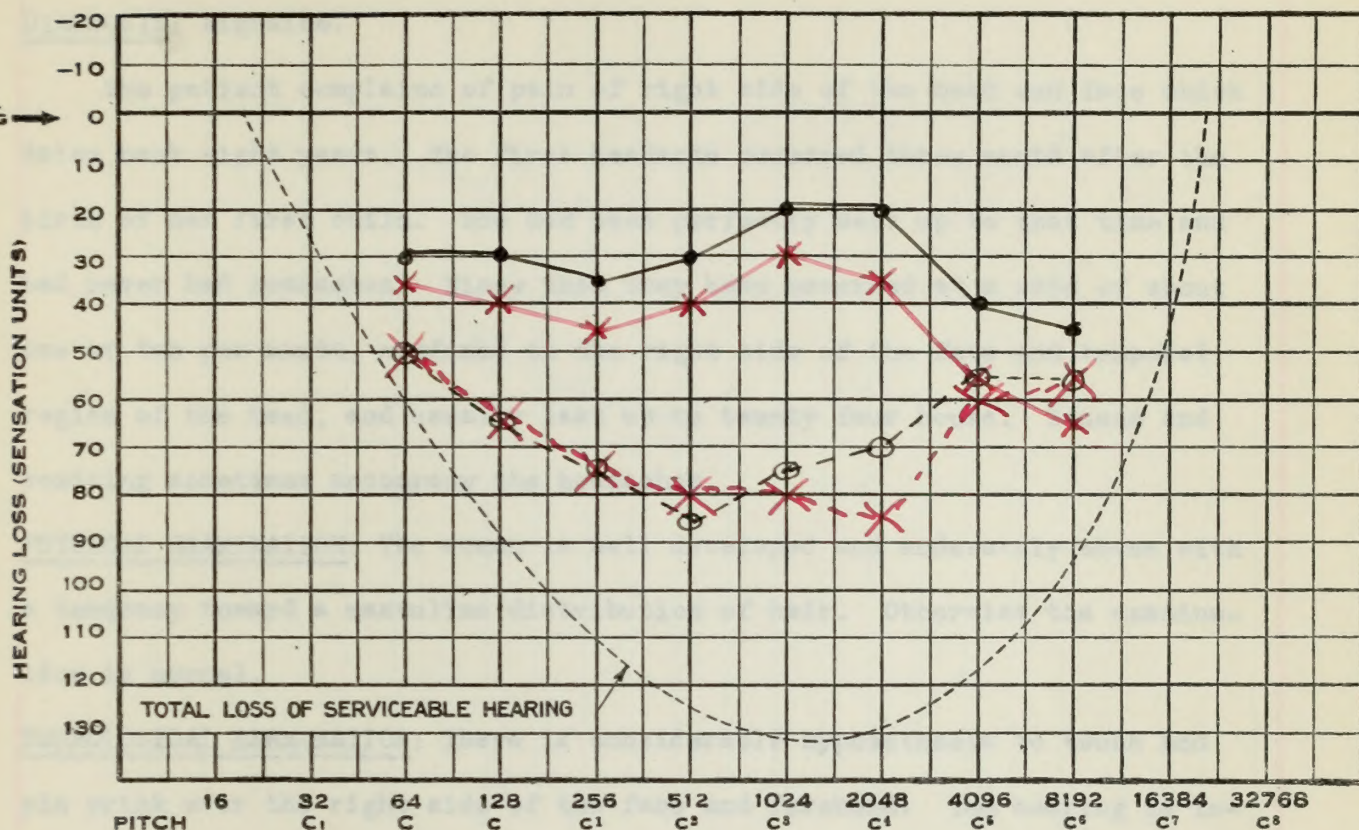
URINE: Yellow; cloudy; alkaline; sp. gr. 1.015; no sugar nor albumen; occasional white blood cells in the sediment.

BLOOD: 754 Hgb.; 3,800,000 R.B.C.; 5,900 W.B.C.; Kahn negative; pr. 110/68.

LUNAR FUNCTION: Not done.

Stereo chest plates were taken which showed the lung fields clear.

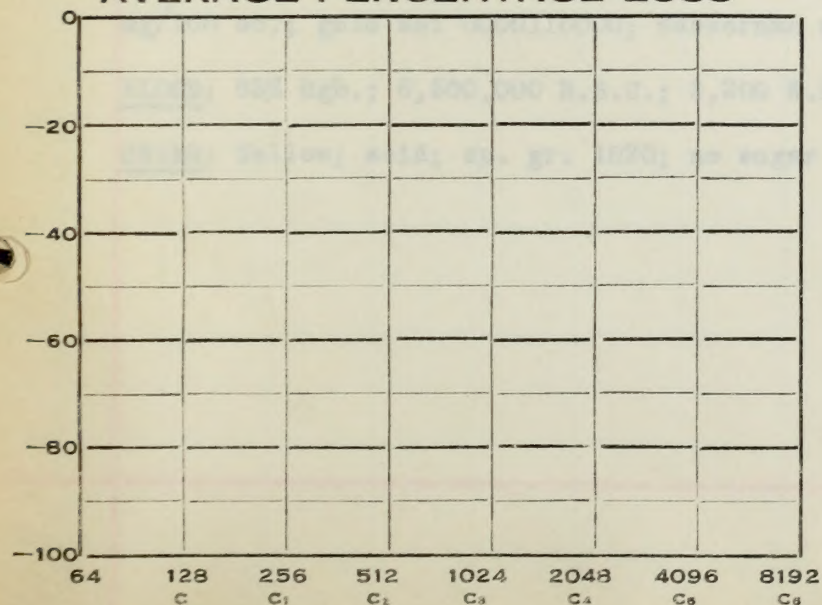
A high caloric diet, with cod liver oil, was established.

EVANS MEMORIAL**AUDIOGRAM**NAME G.N. 707340
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber Left at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

Right Left

Rinne AC

BC

Weber

Upper Limit.....

Lower Limit.....

Whisper.....

Voice.....

EVANS MEMORIAL

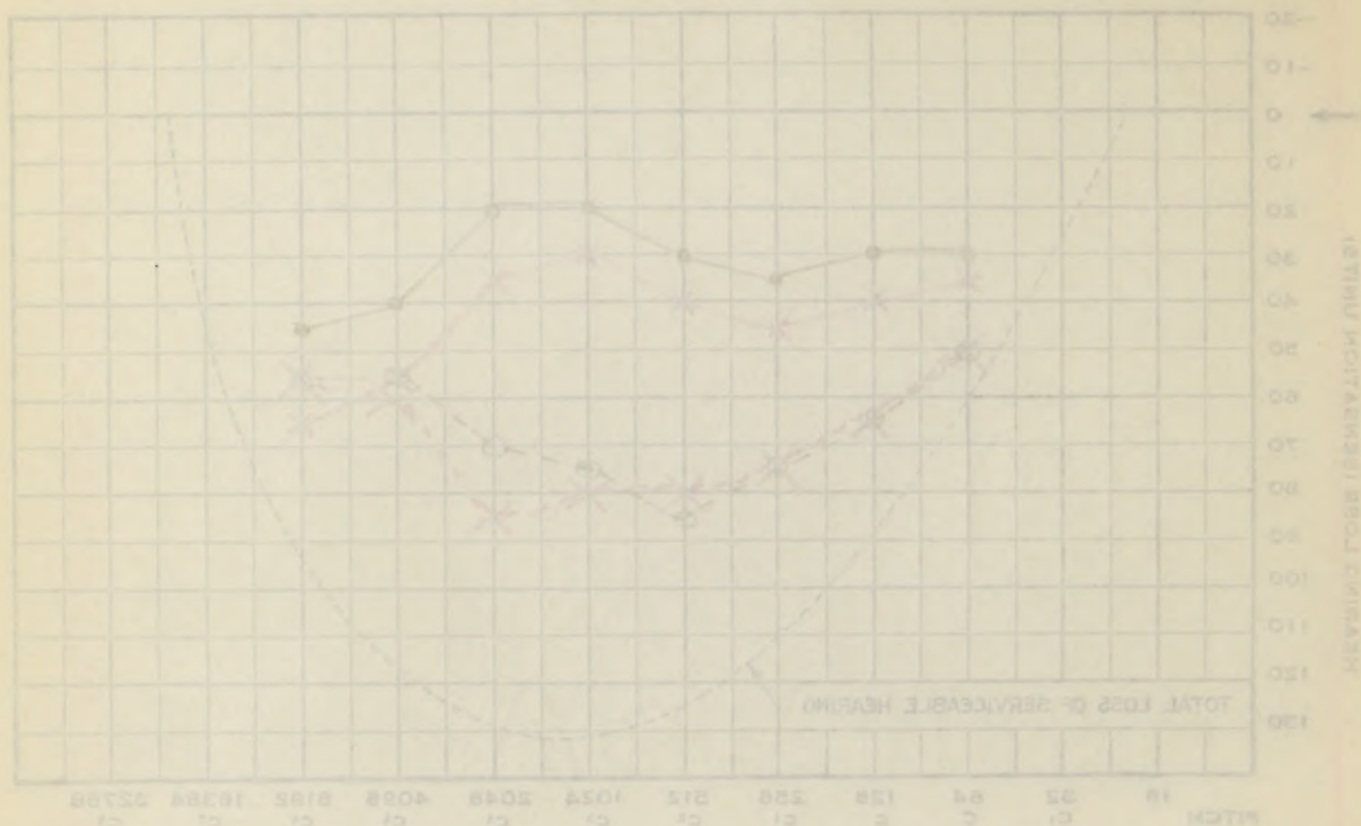
707 340

G.W.

AUDIOGRAM

NAME
DATE

19



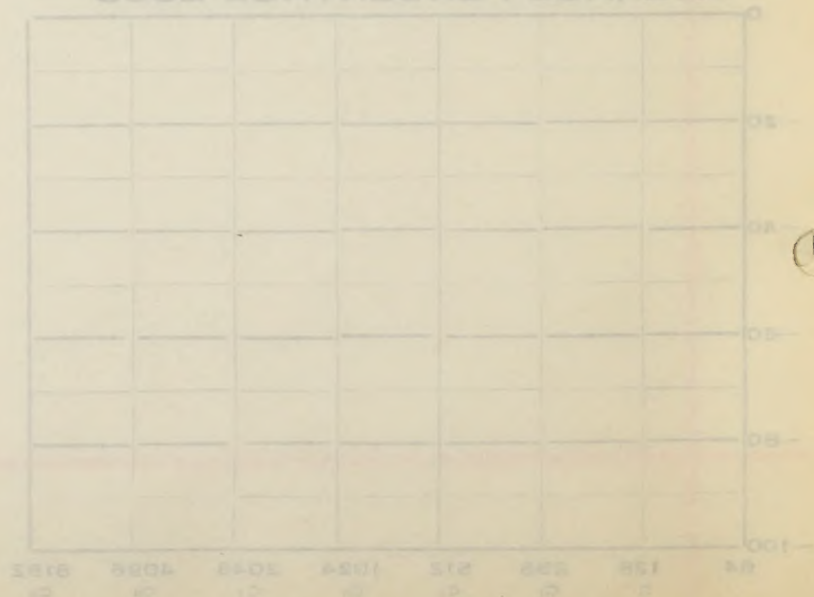
Frequency Hearing Loss

Right Ear

Left Ear

Webster Left at 4 Points

AVERAGE PERCENTAGE LOSS



Diagnosis

Location

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

Right

Left

Rinne AC

Webster

Upper Limit

Lower Limit

Whisper

Voice

G...N...; #707,340; Female; Age 36; White; Married.

DIAGNOSIS: Migraine.

The patient complains of pain of right side of the head and face which dates back eight years. The first headache occurred three month after the birth of her first child. She had been perfectly well up to that time and had never had headaches. Since then they have occurred at a rate of about one or two per month, confined to the right side of the face and temporal region of the head, and usually last up to twenty four hours. Nausea and vomiting sometimes accompany the headaches.

PHYSICAL EXAMINATION: The woman is well developed and moderately obese with a tendency toward a masculine distribution of hair. Otherwise the examination is normal.

NEUROLOGICAL EXAMINATION: There is considerable hypoesthesia to touch and pin prick over the right side of the face and forehead. The hearing is impaired on the right with a Weber lateralized to the left but air conduction is greater than bone conduction on both sides. There is a slightly abnormal degree of mobility of the joints.

LUMBAR PUNCTURE: I.P. 140; dynamics normal; 10 cc. removed; F.P. 90; appearance normal; No R.B.C.; W.B.C., polys, Ross-Jones nor Pandy; protein 17 mg/100 cc.; gold sol 0000110000; Wasserman negative.

BLOOD: 85% Hgb.; 5,500,000 R.B.C.; 8,200 W.B.C.; pressure 120/80.

URINE: Yellow; acid; sp. gr. 1020; no sugar nor albumen.

G...M...; 4707, 240; female; age 38; white; married.

DIAGNOSIS: Migraine.

The patient complains of pain of right side of the head and face which dates back eight years. The first headache occurred three months after the birth of her first child. She had been perfectly well up to that time and had never had headaches. Since then they have occurred at a rate of about one or two per month, confined to the right side of the face and temporal region of the head, and usually last up to twenty-four hours. Nausea and vomiting sometimes accompany the headaches.

PHYSICAL EXAMINATION: The woman is well developed and moderately obese with a tendency toward a masculine distribution of hair. Otherwise the examination is normal.

NEUROLOGICAL EXAMINATION: There is considerable hypoaesthesia to touch and pin prick over the right side of the face and forehead. The hearing is impaired on the right with a Weber lateralized to the left but air conduction is greater than bone conduction on both sides. There is a slightly abnormal degree of mobility of the joints.

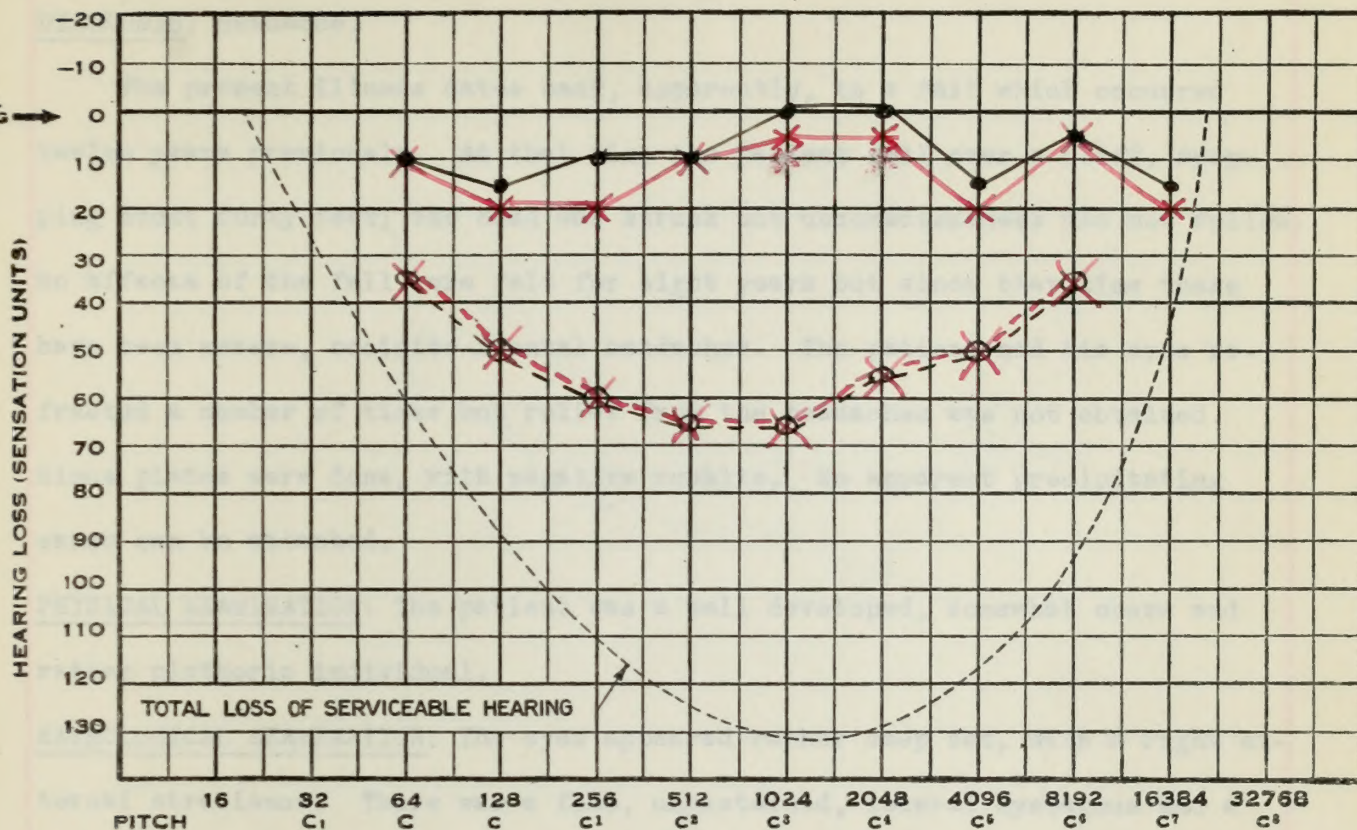
LABORATORY FUNCTIONS: I.P. 140; dynamics normal; 10 cc. removed; R.P. 80; appear-

ance normal; No R.E.C.; W.B.C., poly, Ross-Jones not Pandey; protein IV

mg/100 cc.; Gold sol 0000010000; Wasserman negative.

BLOOD: 85% Hgb.; 6,500,000 R.B.C.; 8,200 W.B.C.; pressure 120/80.

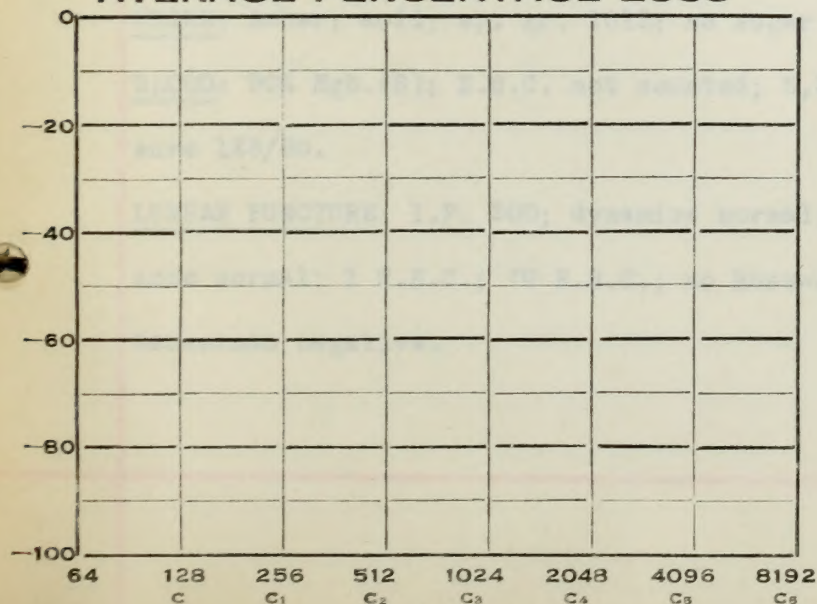
URINE: Yellow; acid; sp. gr. 1020; no sugar nor albumen.

EVANS MEMORIAL**AUDIOGRAM**NAME H. R. 693 446
DATE _____ 19__

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber = at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

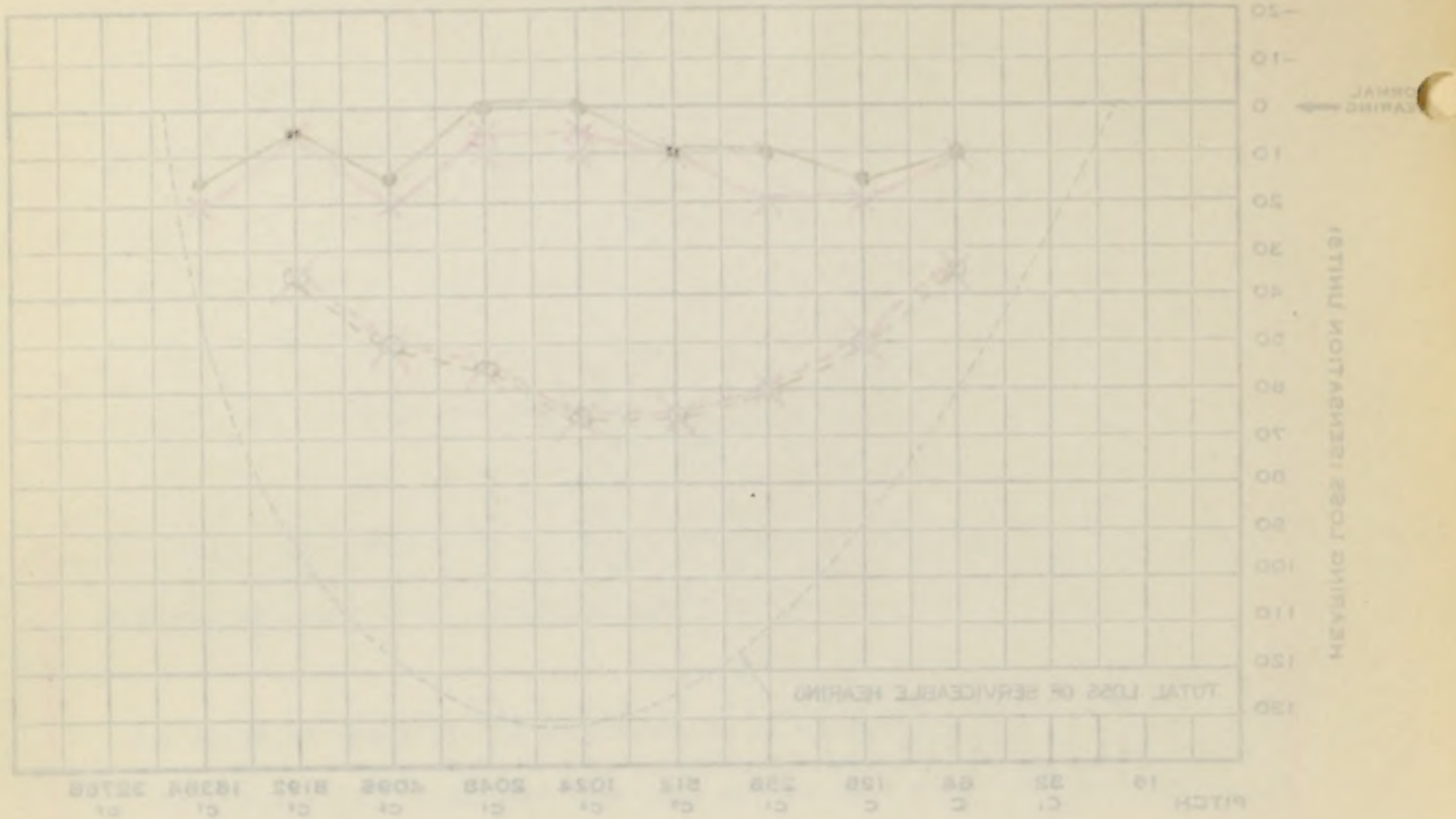
EVANS MEMORIAL

693446

NAME A. K.

AUDIOGRAM

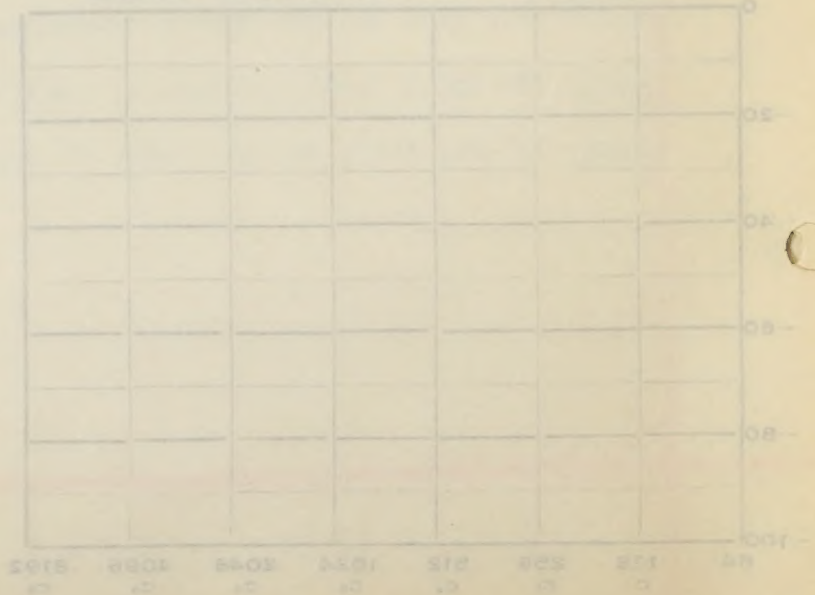
DATE



Percentage Hearing Loss
Right Ear
Left Ear

Weber = at 4 Points

AVERAGE PERCENTAGE LOSS



Diagnosis
Duration
Chief Complaint
1. Discharge
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Deafness
Signs
Left
Right
AC
Rinne
Weber
Upper Limit
Lower Limit
Whisper
Voice

L... R...; #693,446; Male; Age 25; White; Single.

DIAGNOSIS: Headache.

The present illness dates back, apparently, to a fall which occurred twelve years previously. At that time the patient fell over a cliff, dropping about forty feet; the head was struck but unconsciousness did not follow. No effects of the fall were felt for eight years but since that time there have been severe, occipito-frontal headaches. The patient had his eyes refracted a number of times but relief from the headaches was not obtained. Sinus plates were done, with negative results. No apparent precipitating cause can be attached.

PHYSICAL EXAMINATION: The patient was a well developed, somewhat obese and rather plethoric individual.

NEUROLOGICAL EXAMINATION: The eyes appeared rather deep set, with a right external strabismus. There was a fine, unsustained, lateral nystagmus and a slight vasomotor instability. Stereo plates of the skull were within normal limits. The patient has noted that he is somewhat unstable, emotionally. Headaches which occurred while on the ward persisted for two or three hours and were relieved by relaxation. Gynergin was tried, without effect. On one occasion a headache was relieved by a severe nosebleed.

URINE: Amber; acid; sp. gr. 1012; no sugar nor albumen.

BLOOD: 90% Hgb.(S); R.B.C. not counted; 6,300 W.B.C.; Kahn negative; pressure 128/80.

LUMBAR PUNCTURE: I.P. 200; dynamics normal; 25 cc. removed; F.P. 110; appearance normal; 1 W.B.C.; 70 R.B.C.; no Ross-Jones nor Pandy; gold sol 000000000; Wasserman negative.

EVANS MEMORIAL**AUDIOGRAM**

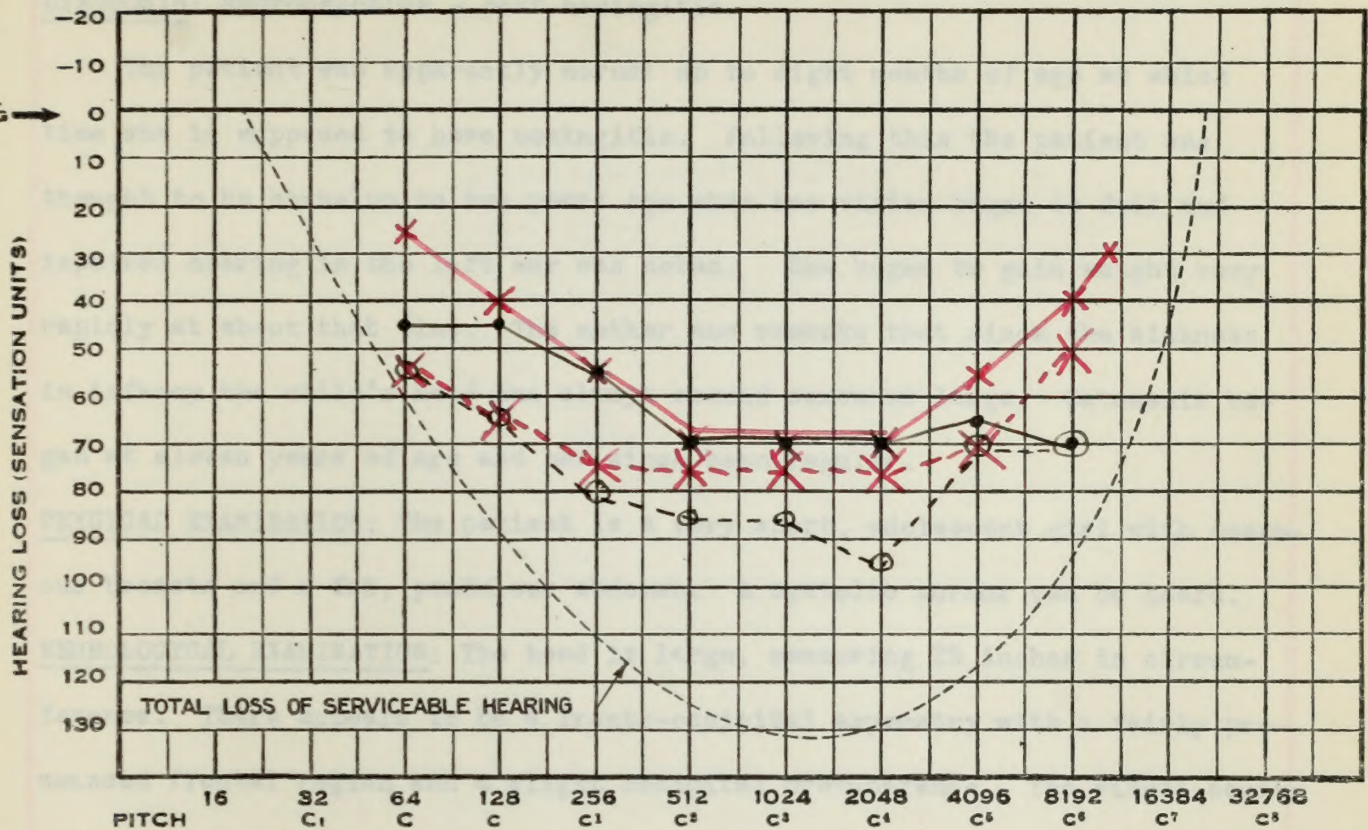
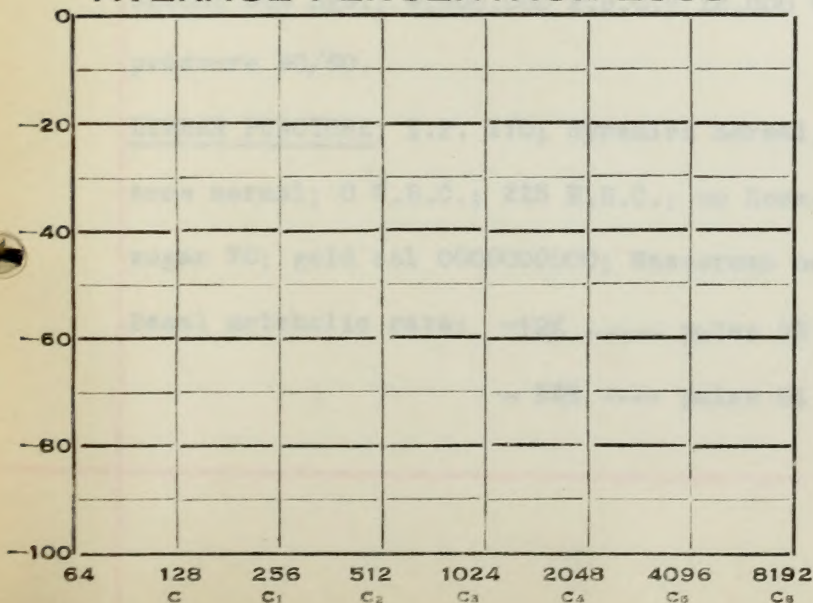
NAME

M.B.

714803

DATE

19

**AVERAGE PERCENTAGE LOSS***Weber Right at 4 Points*

Disease

Duration

Chief Symptom

1. Deafness

2. Pain

3. Discharge

4. Tinnitus

5. Headache

6. Dizziness

RightLeftRinne $\frac{AC}{BC}$

Weber

Upper Limit

Lower Limit

Whisper

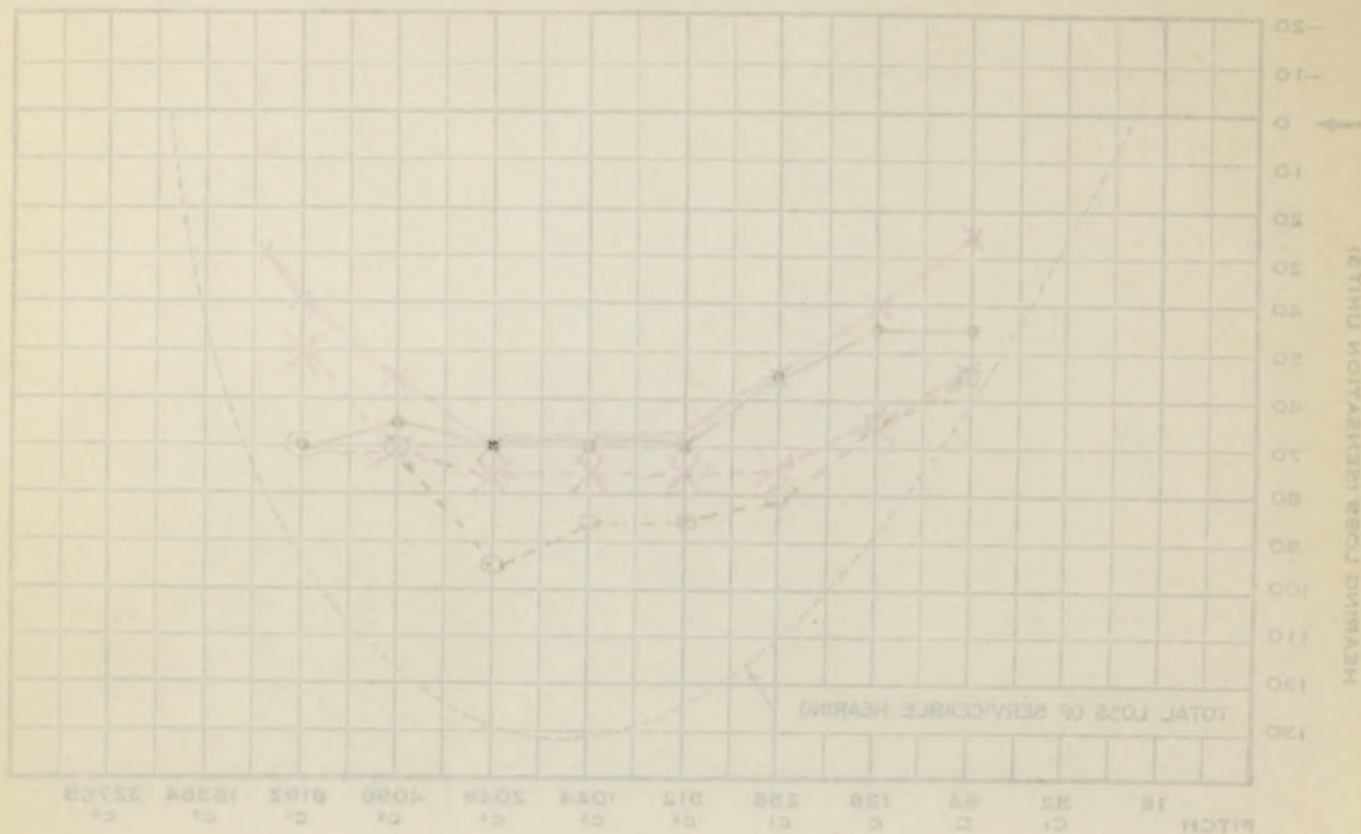
Voice

EVANS MEMORIAL

AUDIOGRAM

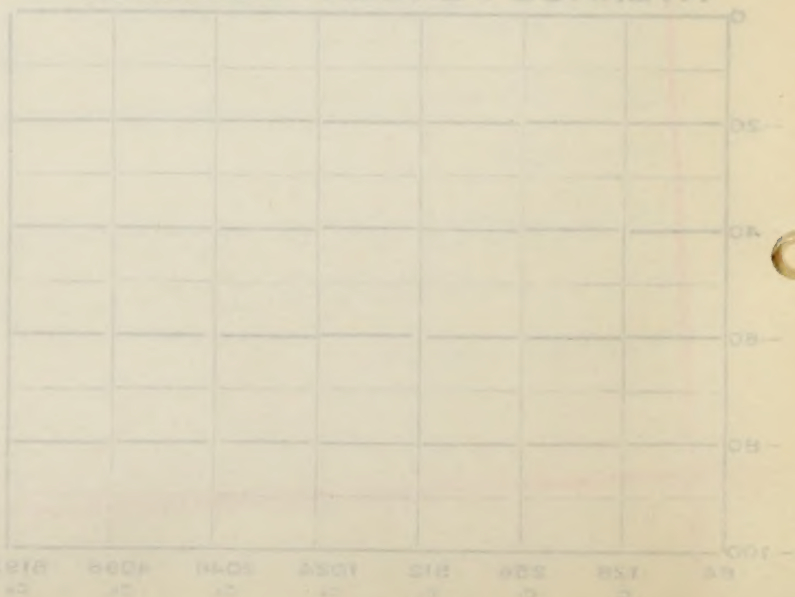
NAME M.R.
DATE 10

714803



Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Weber Right at 4 points

Diagnosis
Duration
Chief Symptom
1. Deafness
2. Tinnitus
3. Discharge
4. Itching
5. Headache
6. Dizziness
Right
Left
AC
Rinne
Weber
Upper limb
Lower limb
Whisper
Voice

M...E...B...; Female; Age 15; White; Single.

DIAGNOSIS: Hydrocephalus - post-meningitic.

The patient was apparently normal up to eight months of age at which time she is supposed to have meningitis. Following this the patient was thought to be normal up to two years ago when her vision began to fail and impaired hearing in the left ear was noted. She began to gain weight very rapidly at about that time. The mother now remarks that since the sickness in infancy the child's head has always seemed somewhat large. Catamenia began at eleven years of age and has since been regular.

PHYSICAL EXAMINATION: The patient is a very short, adolescent girl with enormous breasts and a fat, pendulous abdomen. A systolic murmur can be heard.

NEUROLOGICAL EXAMINATION: The head is large, measuring 25 inches in circumference. There appears to be a fronto-occipital asymmetry with a fairly pronounced frontal region and a slight occipital protuberance. The visual acuity is impaired, the right more than the left, with both discs showing a blurring of the edges but grossly normal fields. X-ray of the skull shows it to be abnormally large, with an increased intracranial pressure, the sella turcica wider and deeper than normal and a widening of the suture lines.

URINE: Yellow; alkaline; sp. gr. 1010; no sugar nor albumen.

BLOOD: 80% Hgb.; 4,800,000 R.B.C.; 12,000 W.B.C.; Kahn negative; B.S. 93; pressure 90/60.

LUMBAR PUNCTURE: I.P. 170; dynamics normal; 10 cc. removed; F.P. 65; appearance normal; 0 W.B.C.; 225 R.B.C.; no Ross-Jones nor Pandy; protein 40 mg/100 sugar 70; gold sol 0000000000; Wasserman negative.

Basal metabolic rate: -12% ----- pulse 72

- 22% ----- pulse 64

M...E...; Female; Age 15; White; Single.

DIAGNOSIS: Hydrocephalus - post-meningitic.

The patient was apparently normal up to eight months of age at which time she is supposed to have meningitis. Following this the patient was thought to be normal up to two years ago when her vision began to fail and impaired hearing in the left ear was noted. She began to gain weight very rapidly at about that time. The mother now remarks that since the sickness in infancy the child's head has always seemed somewhat large. Catamenia began at eleven years of age and has since been regular.

PHYSICAL EXAMINATION: The patient is a very short, adolescent girl with sparse breasts and a fat, pendulous abdomen. A systolic murmur can be heard.

NEUROLOGICAL EXAMINATION: The head is large, measuring 25 inches in circumference. There appears to be a fronto-occipital asymmetry with a fairly pronounced frontal region and a slight occipital protuberance. The visual acuity is impaired, the right more than the left, with both discs showing a diverting of the edges but grossly normal fields. X-ray of the skull shows it to be abnormally large, with an increased intracranial pressure, the sella turcica wider and deeper than normal and a widening of the suture lines.

URINE: Yellow; alkaline; sp. gr. 1.010; no sugar nor albumen.

BLOOD: 500 Rbc.; 4,800,000 R.B.C.; 12,000 W.B.C.; Kahn negative; S.E. 93;

pressure 90/60.

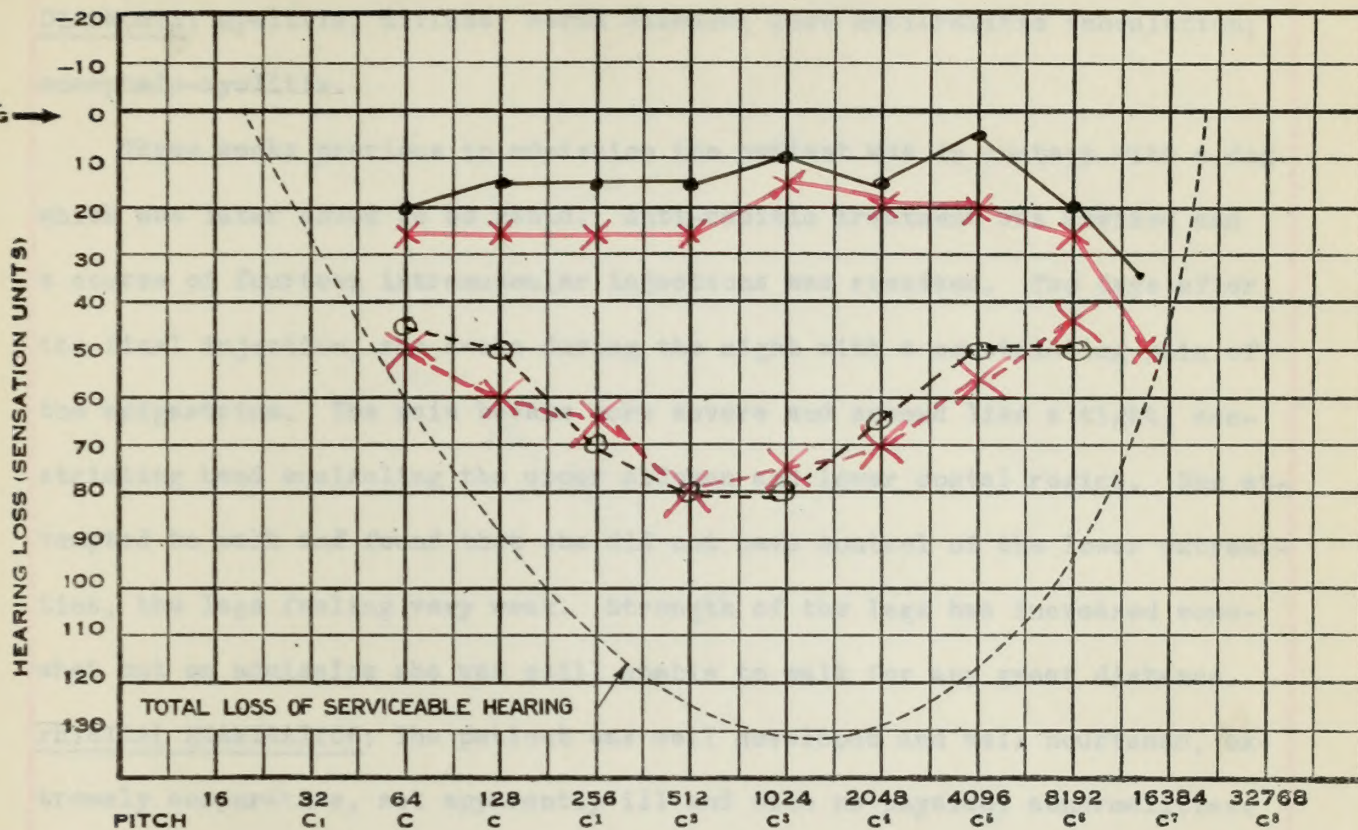
LABORATORY: I.P. 170; dynamic normal; 10 cc. removed; P.P. 85; appear-

ance normal; 0 W.B.C.; 225 R.B.C.; no Ross-Jones nor Bandy; protein 40 mg/100

sugar 70; gold sol 0000000000; Wasserman negative.

Basal metabolic rate: -12% pulse 72

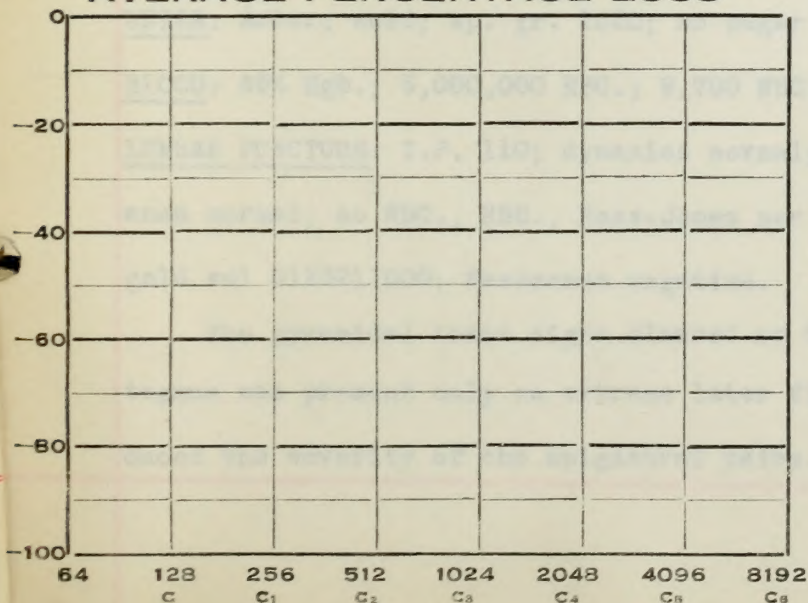
-22% pulse 64

EVANS MEMORIAL**AUDIOGRAM**NAME T. L. H. 742404
DATE..... 19.....

Percentage Hearing Loss

Right Ear

Left Ear

AVERAGE PERCENTAGE LOSS*Weber Left at 4 Points*

Disease

Duration

Chief Symptom.....

1. Deafness.....
2. Pain.....
3. Discharge.....
4. Tinnitus.....
5. Headache.....
6. Dizziness.....

RightLeftRinne AC
BC

Weber.....

Upper Limit.....

Lower Limit.....

Whisper.....

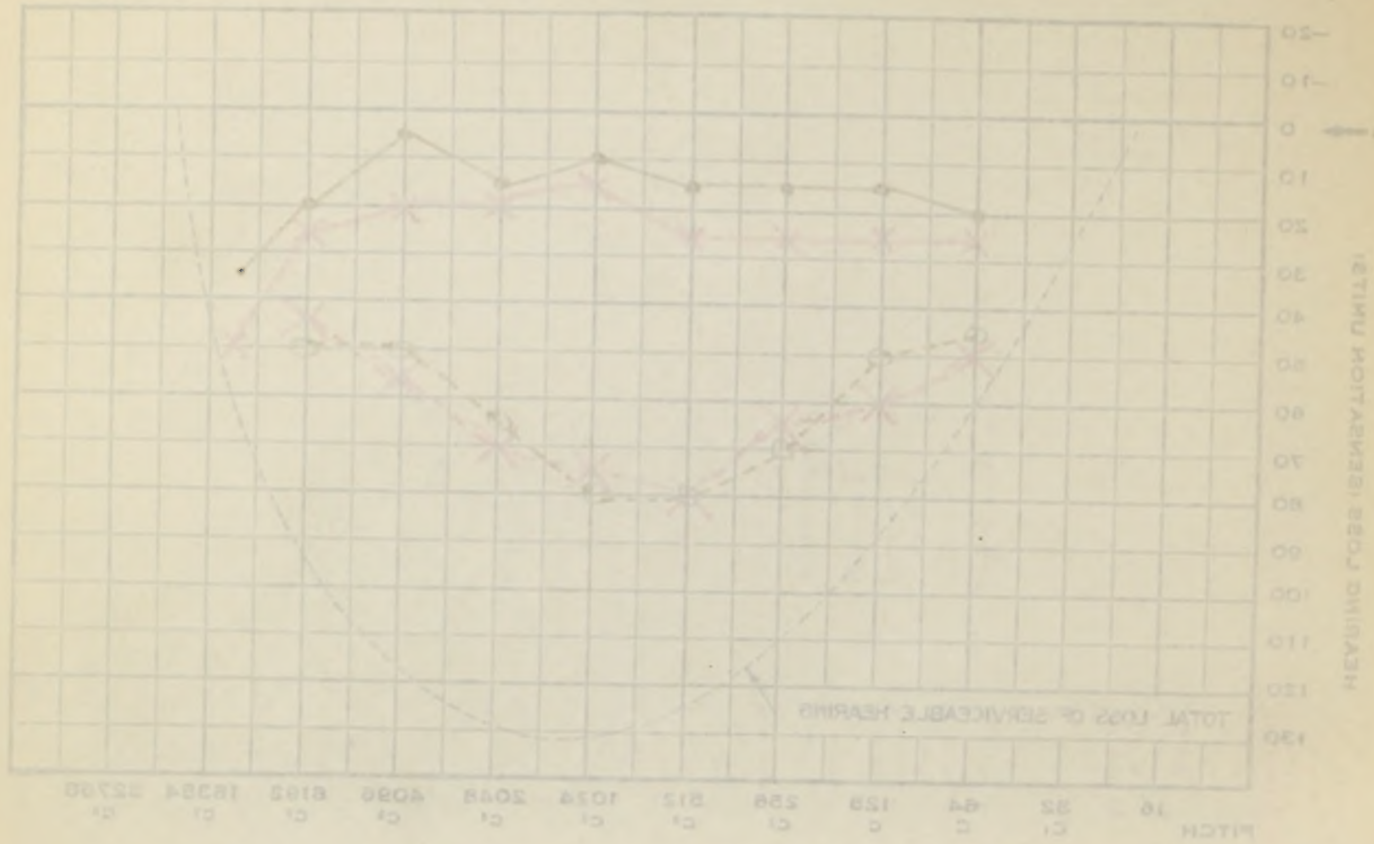
Voice.....

EVANS MEMORIAL

J. L. H. 747404

AUDIOGRAM

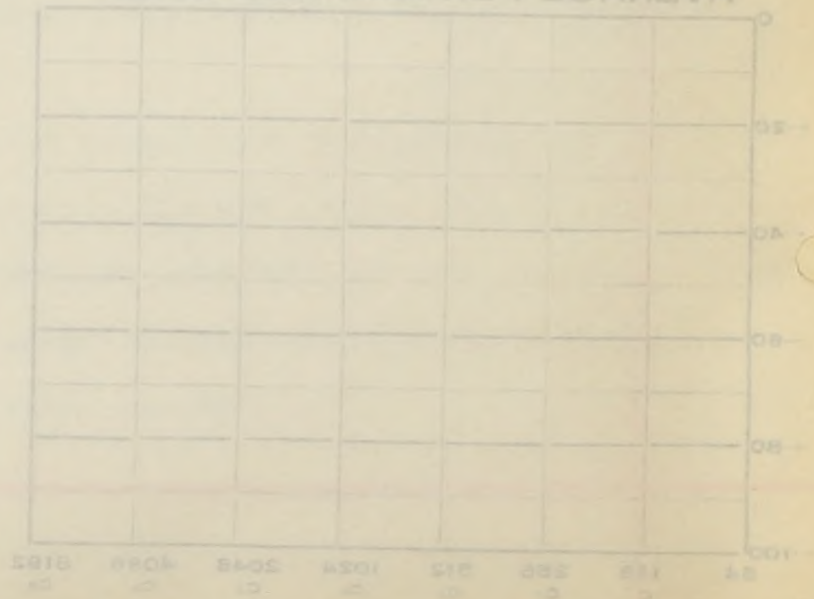
NAME
DATE



Percentage Hearing Loss
Right Ear
Left Ear

Weber Left at 4 Points

AVERAGE PERCENTAGE LOSS



Diagnosis
Description
Chief Complaint
1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right
Left

Reason
Weber
Upper Limb
Lower Limb
Whisper
Voice

T... L... H...; #742,404; Female; Age 39; White; Married.

DIAGNOSIS: Myelitis, diffuse; serum disease; post anti-rabitic inoculation; encephalo-myelitis.

Three weeks previous to admission the patient was in contact with a dog which was later found to be rabid. Anti-rabitic treatment was advised and a course of fourteen intramuscular injections was received. Two days after the final injection, she awoke during the night with a constricting pain of the epigastrium. The pain became more severe and seemed like a tight, constricting band encircling the upper abdomen and lower costal region. She attempted to walk and found that she did not have control of the lower extremities, the legs feeling very weak. Strength of the legs has increased somewhat but on admission she was still unable to walk for any great distance.

PHYSICAL EXAMINATION: The patient was well developed and well nourished, extremely cooperative, not apparently ill and with no physical abnormalities.

NEUROLOGICAL EXAMINATION: The optic fundi were negative but there was a well sustained nystagmus on deviation to the right and left. The deep reflexes were hyperactive throughout with bilateral patellar and ankle clonus and bilateral positive Chaddock and Babinski. The vibratory sense was diminished in both extremities.

URINE: Amber; acid; sp. gr. 1020; no sugar nor albumen.

BLOOD: 85% Hgb.; 5,000,000 RBC.; 9,700 WBC.; Kahn negative; pressure 120/85.

LUMBAR PUNCTURE: I.P. 110; dynamics normal; 15 cc. removed; F.P. 45; appearance normal; no WBC., RBC., Ross-Jones nor Pandy; protein 30 mg/100 cc.; gold sol 0123211000; Wasserman negative.

The pyramidal tract signs cleared up during the hospitalization and nystagmus was present only on extreme later fixation. Infra-red therapy reduced the severity of the epigastral pains.

T... L... H...; 7/25/50; Female; Age 38; White; Married.

DIAGNOSIS: Myelitis, diffuse; serum disease; post anti-rheumatic inoculation; anaphylaxis.

Three weeks previous to admission the patient was in contact with a dog which was later found to be rabid. Anti-rheumatic treatment was given and a course of fourteen intramuscular injections was received. Two days after the final injection, she awoke during the night with a constricting pain of the epigastrium. The pain became more severe and seemed like a tight, constricting band encircling the upper abdomen and lower costal region. She responded to walk and found that she did not have control of the lower extremities, the legs feeling very weak. Strength of the legs has increased somewhat but on admission she was still unable to walk for any great distance.

PHYSICAL EXAMINATION: The patient was well developed and well nourished, extremely cooperative, not apparently ill and with no physical abnormalities.

NEUROLOGICAL EXAMINATION: The optic fundi were negative but there was a well

sustained nystagmus on deviation to the right and left. The deep reflexes were hyperactive throughout with bilateral patellar and ankle clonus and bilateral positive Chaddock and Babinski. The vibratory sense was diminished in both extremities.

URINE: Amber; solid; sp. gr. 1.020; no sugar nor albumen.

BLOOD: Hgb. 8.000, 000 RBC.; 2,700 WBC.; Kahn negative; pressure 120/85.

MUSCLE FIBERS: I.F. 110; dynamometer normal; 15 cc. removed; F.P. 48; appear-

ance normal; no WBC., RBC., Ross-Jones not done; protein 30 mg/100 cc.

Gold sol 0.125/1000; Wassermann negative.

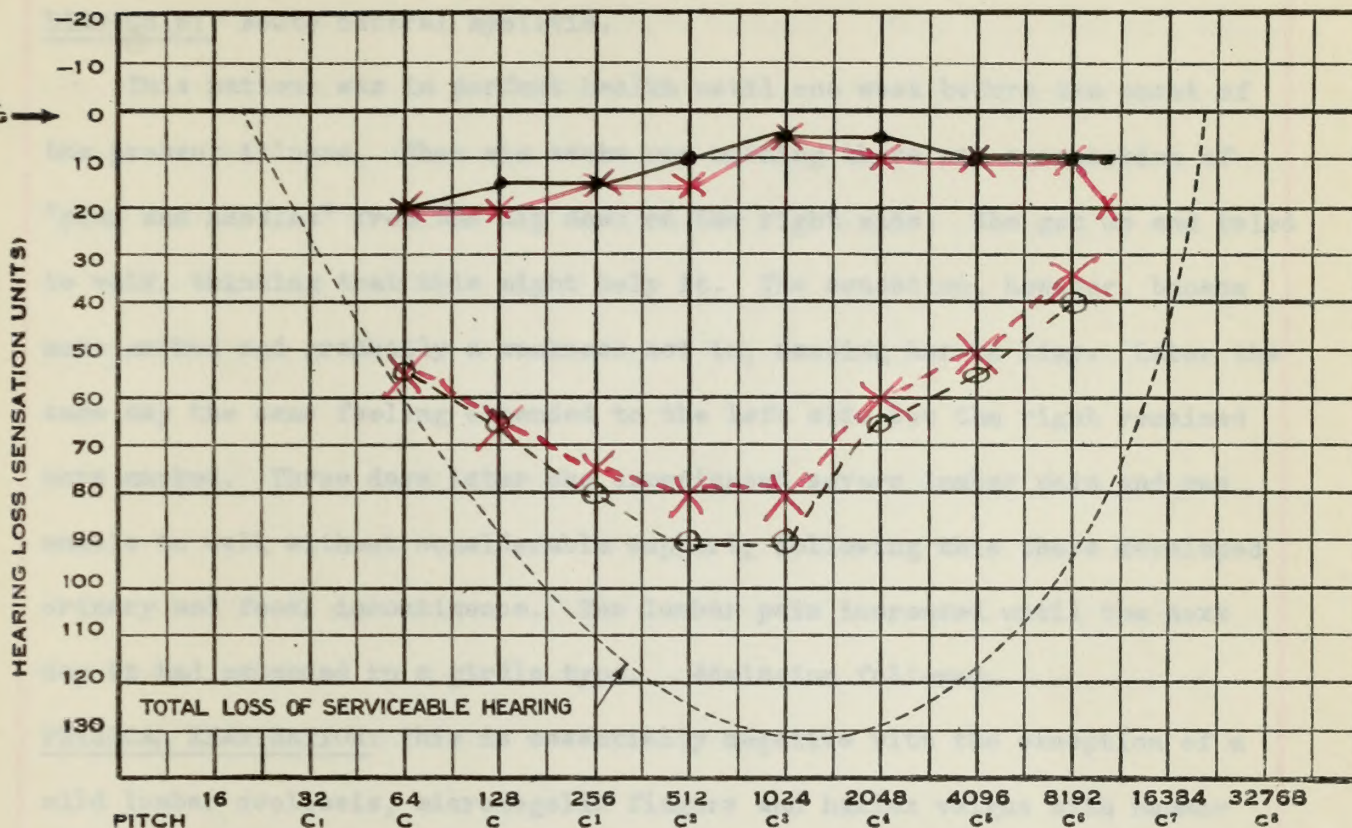
The pyramidal tract signs cleared up during the hospitalization and my-

elitis was present only on extreme lateral flexion. Infra-red therapy re-

duced the severity of the epigastric pain.

EVANS MEMORIAL**AUDIOGRAM**NAME L.M.M. 742,249.

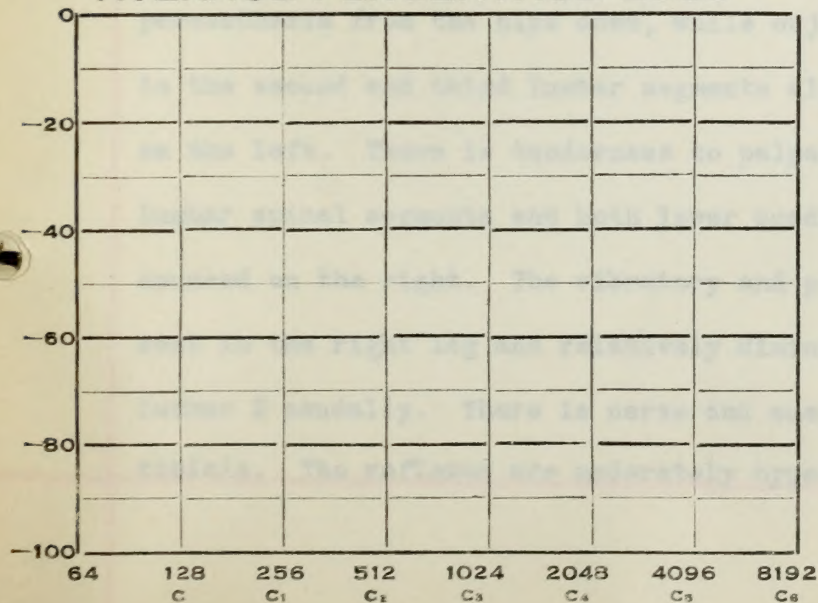
DATE 19



Percentage Hearing Loss

Right Ear

Left Ear

*Weber Left at 4 Points***AVERAGE PERCENTAGE LOSS**

Disease

Duration

Chief Symptom

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

RightLeftRinne AC
BC

Weber

Upper Limit

Lower Limit

Whisper

Voice

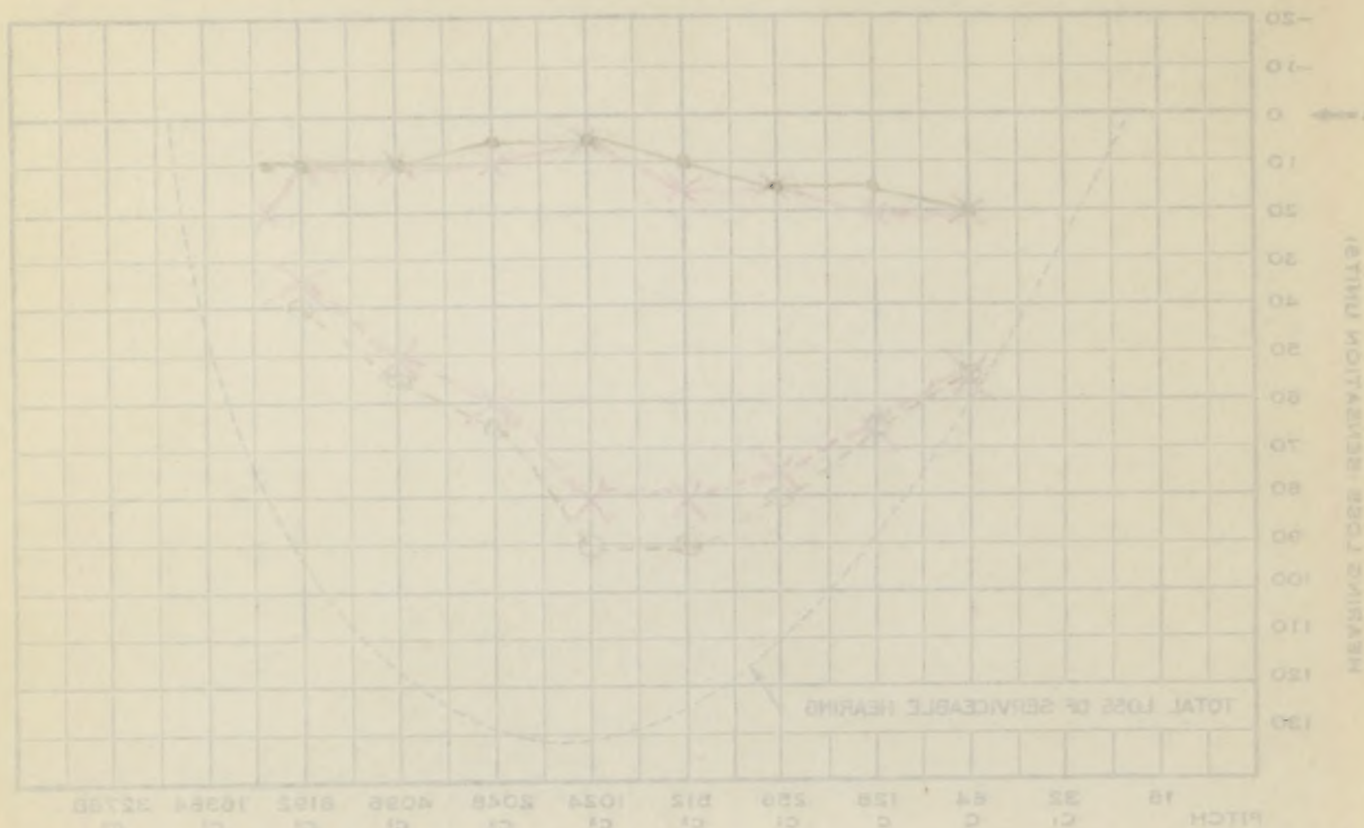
EVANS MEMORIAL

AUDIOGRAM

NAME
DATE

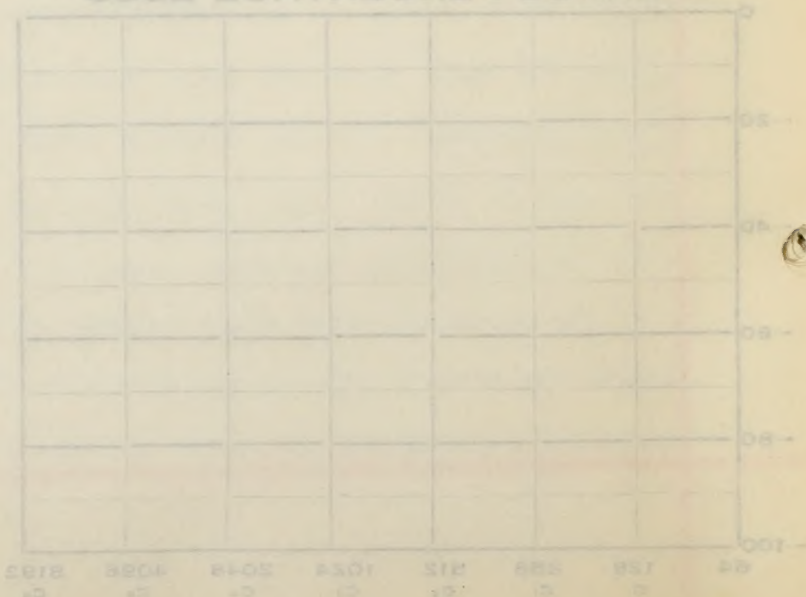
L.M.M. 744,249

18



Frequency Range: 16-32768 Hz
Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Weber Left at 4 points

Diagnosis
Duration
Chief Complaint
1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right
Left

Rinne AC
Weber
Upper Limb
Lower Limb
Whisper
Voice

L...M...; #742,249; Female; Age 32; White; Married.

DIAGNOSIS: Acute central myelitis.

This patient was in perfect health until one week before the onset of the present illness. When she awoke one morning there was a sensation of "pins and needles" from the hip down on the right side. She got up and tried to walk, thinking that this might help it. The sensation, however, became more marked and gradually a weakness set in, causing her to limp. Later the same day the same feeling extended to the left side but the right remained more marked. Three days later she experienced severe lumbar pain and was unable to walk without considerable support; following this there developed urinary and fecal incontinence. The lumbar pain increased until the next day it had extended to a girdle type. Admission followed.

PHYSICAL EXAMINATION: This is essentially negative with the exception of a mild lumbar scoliosis, micromegalic fingers and hallux valgus with hammer toe on left.

NEUROLOGICAL EXAMINATION: Sphincter control is weak but not absent. The entire right leg is weak to all movements, being more marked in abduction and flexion of the thigh and flexor extension of the ankle. Heel to shin test not done with right, but left is normal. Subjectively there is a bilateral paraesthesia from the hips down, while objectively hypalgesia and anesthesia in the second and third lumbar segments also involving the sacral segments on the left. There is tenderness to palpation over the second to fourth lumbar spinal segments and both lower quadrants, which is slightly more pronounced on the right. The vibratory and position sense is diminished to absent in the right leg and relatively diminished in the left leg and from lumbar 2 caudally. There is nerve and muscle tenderness of the calves and tibials. The reflexes are moderately hyperactive with a more pronounced

L...M...; 4742, 249; Female; Age 33; White; Married.

DIAGNOSIS: Acute central myelitis.

This patient was in perfect health until one week before the onset of the present illness. When she awoke one morning there was a sensation of "pins and needles" from the hip down on the right side. She got up and tried to walk, thinking that this might help it. The sensation, however, became more marked and gradually a weakness set in, causing her to limp. Later the same day the same feeling extended to the left side but the right remained more marked. Three days later she experienced severe lumbar pain and was unable to walk without considerable support; following this there developed urinary and fecal incontinence. The lumbar pain increased until the next day it had extended to a knee type. Admission followed.

PHYSICAL EXAMINATION: This is essentially negative with the exception of a mild lumbar scoliosis, micromegaly of fingers and hallux valgus with hammer toe on left.

NEUROLOGICAL EXAMINATION: Spinothalamic control is weak but not absent. The entire right leg is weak to all movements, being more marked in abduction and flexion of the thigh and flexor extension of the ankle. Heel to shin test not done with right, but left is normal. Subjectively there is a bilateral paresthesia from the hips down, while objectively hypaesthesia and anaesthesia in the second and third lumbar segments also involving the sacral segments on the left. There is tenderness to palpation over the second to fourth lumbar spinal segments and both lower quadrants, which is slightly more pronounced on the right. The vibratory and position sense is diminished to absent in the right leg and relatively diminished in the left leg and from lumbar 2 caudally. There is nerve and muscle tenderness of the calves and thighs. The reflexes are moderately hyperactive with a more pronounced

ankle jerk and knee jerk on the right while the left are considerably greater with a few unsustained ankle and patella repeats. There is a positive Babinski, Oppenheim and Chaddock, bilaterally. The pupils are myopic with the right less than the left, but react well to light and accommodation.

URINE: Cloudy yellow; alkaline; sp. gr. 1027; no sugar nor albumen; oxylate and urate crystals in the sediment.

BLOOD: 80% Hgb.; 4,700,000 R.B.C.; 9,000 W.B.C.; N.P.N. 30; B.S. 75; Kahn negative.

LUMBAR PUNCTURE: I.P. 150; dynamics normal; 15 cc. removed; F.P. 70; appearance normal; 4 W.B.C.; 0 polys; 0 R.B.C.; slightly positive Ross-Jones and Pandy; protein 23 mg/100 cc.; chloride 725 mg/100 cc.; gold sol 0010000000; Wasserman negative. A second test showed findings as above with the exception of the gold sol which was 2233310000.

ankle jerk and knee jerk on the right while the left are considerably greater with a few unreacted ankle and patellar reflexes. There is a positive Babinski.

Left, Oppenheim and Chaddock, bilaterally. The pupils are myopic with the

right less than the left, but react well to light and accommodation.

URINE: Cloudy yellow; alkaline; sp. gr. 1.027; no sugar nor albumen; oxylate

and urate crystals in the sediment.

BLOOD: 300 Hgb.; 4,700,000 R.B.C.; 9,000 W.B.C.; R.P.N. 30; S.E. 75; Kahn

negative.

LUMBAR PUNCTURE: 1 P. 150; dynamics normal; 15 cc. removed; P.F. 70; appar-

ance normal; 4 W.B.C.; 0 polys; 0 R.B.C.; slightly positive Rose-Jones and

Pandy; protein 23 mg/100 cc.; chloride 725 mg/100 cc.; gold sol 001000000;

Weissman negative. A second test showed findings as above with the ex-

ception of the gold sol which was 2232310000.

EVANS MEMORIAL

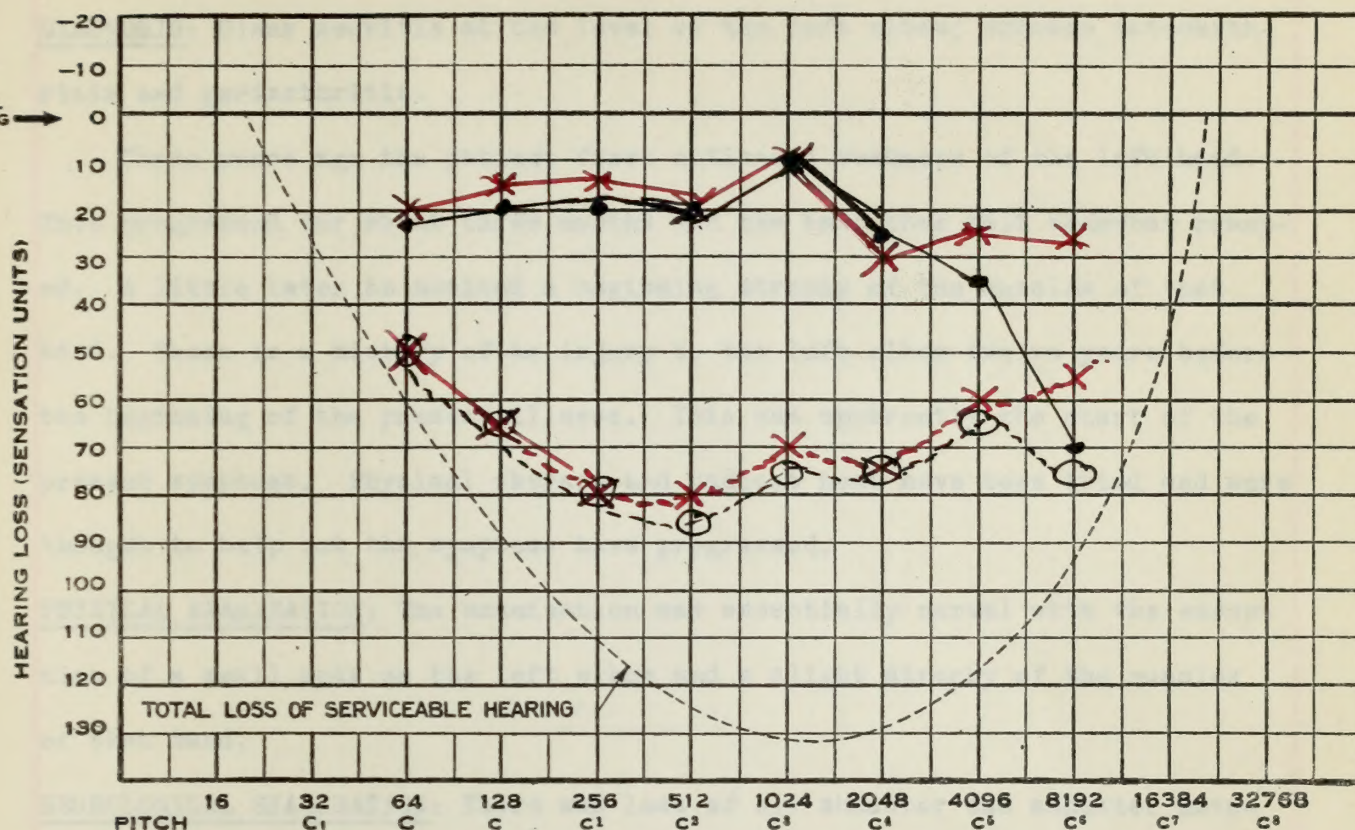
AUDIOGRAM

NAME _____

A. C. 705110.

DATE _____

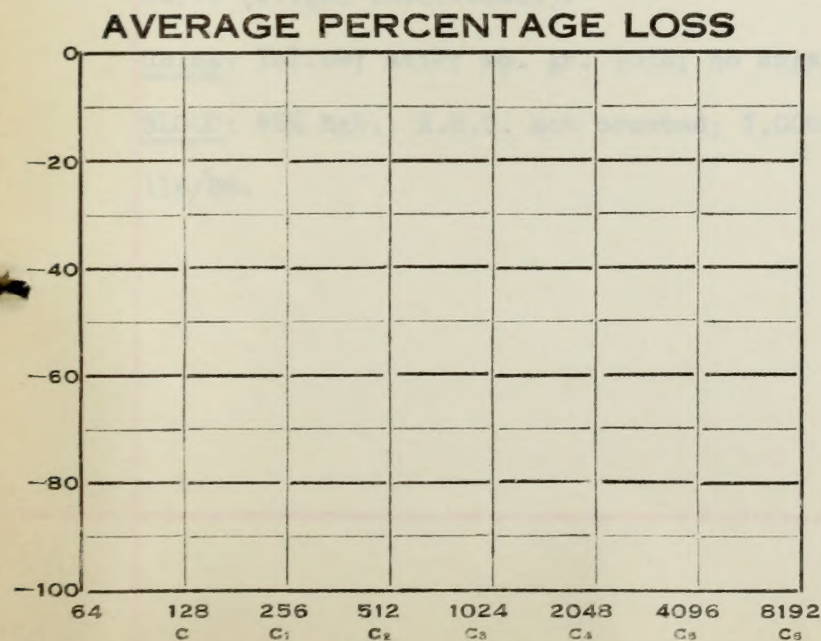
. 19



Percentage Hearing Loss

Right Ear

Left Ear



Disease

Duration

Chief Symptom.....

1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Right

Left

...Rinne $\frac{AC}{BC}$

.... Weber ..

Upper Limit.

Lower Limit.

...Whisper...

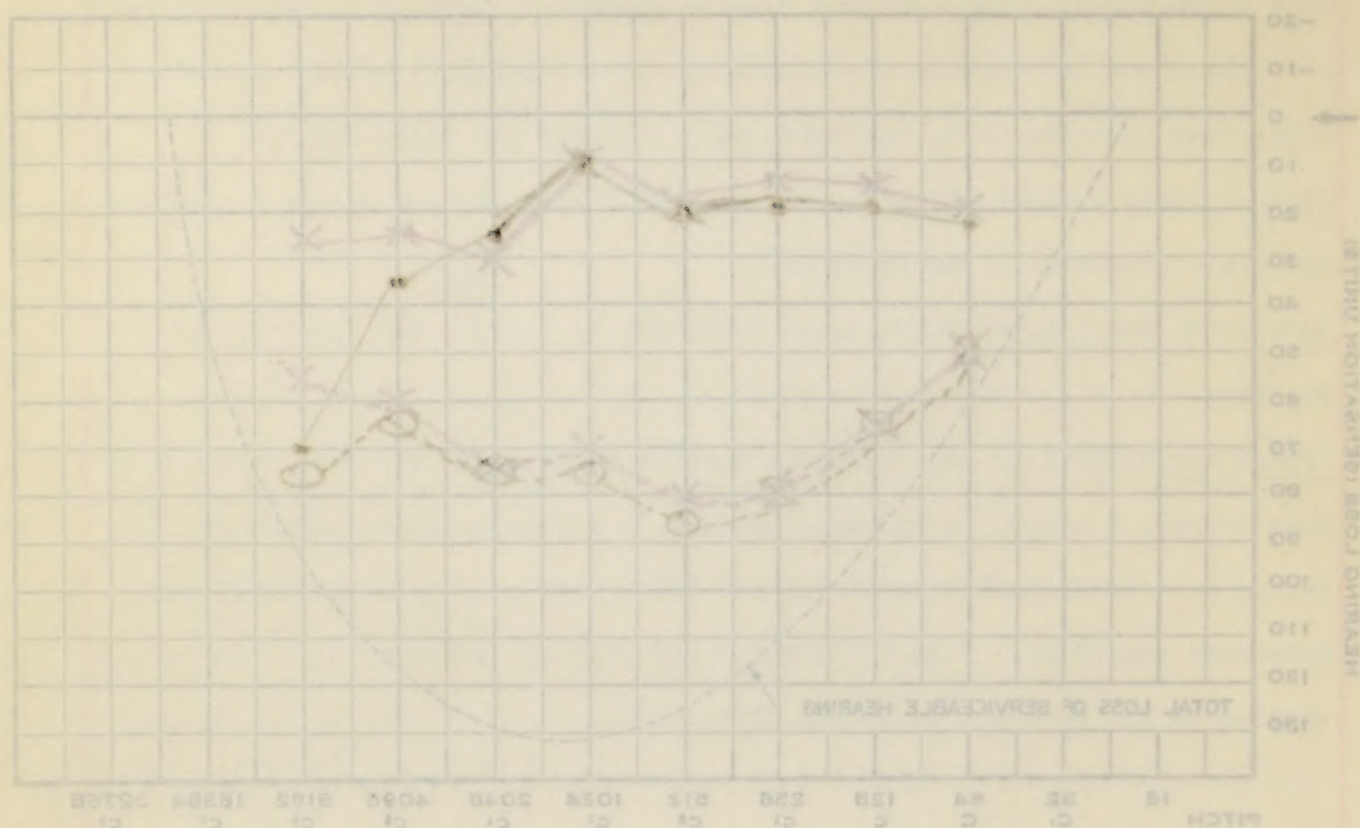
... Voice ...

EVANS MEMORIAL

AUDIOGRAM

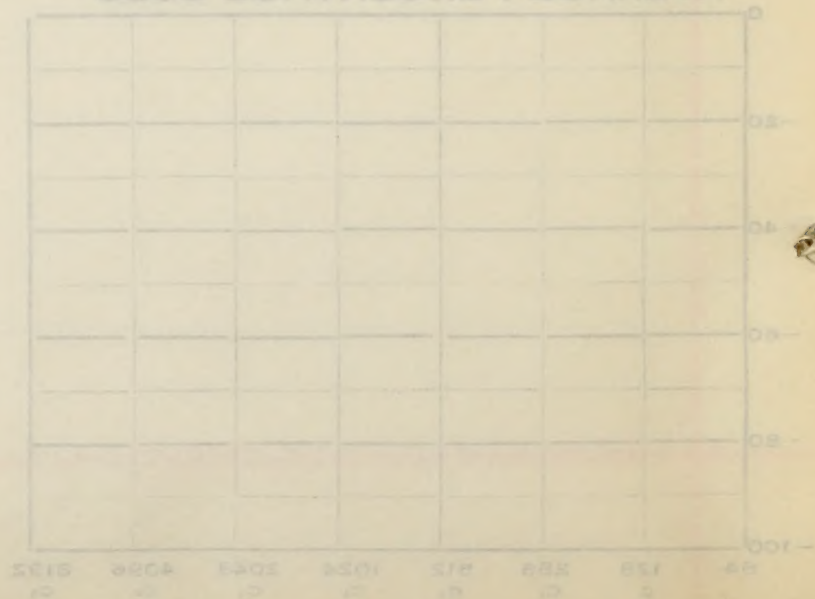
NAME
DATE

J.C. 702110



Percentage Hearing Loss
Right Ear
Left Ear

AVERAGE PERCENTAGE LOSS



Diagnosis
Duration
Chief Complaint
1. Deafness
2. Pain
3. Discharge
4. Tinnitus
5. Headache
6. Dizziness

Left

Right

AD
Rinne
Weber
Upper Limb
Lower Limb
Vision
Hearing

J... C...; #705,110; Male; Age 51; White; Married.

DIAGNOSIS: Ulnar neuritis at the level of the left elbow; chronic osteoarthritis and periarthrititis.

Three years ago the patient first noticed a weakness of the left hand. This progressed for about three months and the hand then felt somewhat cramped. A little later he noticed a beginning atrophy of the muscles of that hand. There is a history of an injury to the left elbow twelve years before the beginning of the present illness. This was apparently the start of the present symptoms. Physical therapy and radiant heat have been tried and were thought to help but the symptoms have progressed.

PHYSICAL EXAMINATION: The examination was essentially normal with the exception of a small scar on the left elbow and a slight atrophy of the muscles of that hand.

NEUROLOGICAL EXAMINATION: There was loss of all abductor and adductor movements of the fingers of the left hand. There was no loss of sensory function over the region. It was apparently an involvement of the ulnar nerve with weakness and atrophy of the abductor pollicis, volar and dorsal interossei, all lumbricals, short muscles of the hypothenar eminence and flexor carpi ulnaris (slight involvement).

URINE: Yellow; acid; sp. gr. 1018; no sugar nor albumen.

BLOOD: 95% Hgb.; R.B.C. not counted; 7,000 W.B.C.; Kahn negative; pressure 114/80.

... C...; W 105, 110; Male; Age 31; White; Married.

DIAGNOSIS: Ulnar neuritis at the level of the left elbow; chronic osteoarth-

ritis and periarthritis.

Three years ago the patient first noticed a weakness of the left hand.

This progressed for about three months and the hand then felt somewhat stiff-

ed. A little later he noticed a beginning atrophy of the muscles of the

hand. There is a history of an injury to the left elbow twelve years before

the beginning of the present illness. This was apparently the start of the

present syndrome. Physical therapy and radiant heat have been tried and were

thought to help but the syndrome have progressed.

PHYSICAL EXAMINATION: The examination was essentially normal with the excep-

tion of a small scar on the left elbow and a slight atrophy of the muscles

of that hand.

NEUROLOGICAL EXAMINATION: There was loss of all abductor and adductor move-

ments of the fingers of the left hand. There was no loss of sensory function

over the region. It was apparently an involvement of the ulnar nerve with

weakness and atrophy of the abductor pollicis, volar and dorsal interossei,

all lumbricals, short muscles of the hypopharynx and flexor carpi ul-

naris (slight involvement).

URINE: Yellow; acid; sp. gr. 1.018; no sugar nor albumen.

BLOOD: Hgb. 15.5; Hct. 45.0; not counted; 7,000 W.B.C.; Kahn negative; pressure

114/80.

The first group of cases is characterized by a very marked lateralization of the auditory evoked response. It is to be noted that in these cases the evoked response is very clearly lateralized and gives rise to a very marked lateralization of the auditory evoked response. There has been a very marked lateralization of the auditory evoked response for the very high tones. Since the case A. W. 724,742 the lateralization is probably due to a lateralized change which occurred while the patient was hospitalized. The cases which are associated with other pathologic changes are considerably more complex and are usually due to a variety of factors rather than the idiopathic epilepsy. This is shown quite clearly in the case of L. G. 712,475 where the presenting symptoms are the epileptic seizures but the background is that of congenital syphilis which has been active in the past.

PART V

The cases of epilepsy which are caused by an injury and rather distinctive changes is associated with the whole group. In these there is always a greater lowering of activity in the early part. This is generally present over the entire spectrum but is more in part lateralized for the higher frequencies. It is probably due to a pressure on the cerebral cortex.

CONCLUSIONS

The cases of multiple sclerosis do not show anything distinctive. The activity is generally lateralized about 20 to 30 seconds after the onset of the attack with the side of the attack showing a reduction in activity for the higher frequencies. The case L. D. 740,512 was probably complicated by an old history of epilepsy while L. F. R. 717,532 shows a large gap which was probably caused by liver pathology. R. D. 740,512 is an atypical case in which the ear changes were due to a localized condition of the vestibular apparatus.

The head injury cases show rather variable changes depending on the location of the injury and the involvement of the brain. It is to be noted

PART V

CONCLUSIONS

The first group of cases are idiopathic epileptics that are not complicated with other diseases. It is to be noted that in these cases the two ears parallel each other very closely and in general show only very slight changes. There does seem to be a slightly abnormal falling-off of the acuity for the very high tones. With the case A. W. 724,947 the lowered acuity is probably due to bodily changes which occurred while on starvation and ketogenic treatments. The cases which are complicated with other pathology show considerably greater changes which are undoubtedly due to extraneous factors rather than the idiopathic epilepsy. This is shown quite clearly in the case of L. O. 711,409 where the presenting symptoms are the cataleptic seizures but the background is that of congenital syphilis which has been active in the past.

The cases of epilepsy which are traced to an injury show rather distinctive changes as compared with the above group. In these there is always a greater lowering of acuity in one of the ears. This is generally present over the entire spectrum but in some is more marked for the higher frequency tones. It is probably due to a pressure on the cerebral cortex.

The cases of multiple sclerosis do not show anything distinctive. The acuity is generally lowered about 20 to 30 sensation units throughout the entire range with the older patients showing a reduction in acuity for the higher frequencies. The case A. D. 745,310 was probably complicated by an old dietary deficiency while E. F. W. 717,582 shows a tone gap which was probably caused by liver pathology. M. D. 700,511 is an atypical case in which the ear changes were due to a localized condition of the conduction apparatus.

The head injury cases show rather variable changes depending on the location of the injury and the seriousness of it. It is to be remarked

The first group of cases are idiopathic epilepsies that are not associated with other diseases. It is to be noted that in these cases the two ears parallel each other very closely and in general show only very slight changes. There does seem to be a slightly abnormal falling-off of the acuity for the very high tones. With the case A. W. 124,247 the lowered acuity is probably due to bodily changes which occurred while on starvation and ketonemic treatment. The cases which are complicated with other pathologies show considerably greater changes which are undoubtedly due to extraneous factors rather than the idiopathic epilepsy. This is shown quite clearly in the case of J. C. 111,402 where the presentation symptoms are the cataplectic seizures but the background is that of congenital epilepsy which has been active in the past.

The cases of epilepsy which are traced to an injury show rather distinctive changes as compared with the above group. In these there is always a greater lowering of acuity in one of the ears. This is generally present over the entire spectrum but is more marked for the higher frequencies of tones. It is probably due to a pressure on the cerebral cortex.

The cases of multiple sclerosis do not show anything distinctive. The acuity is generally lowered about 20 to 30 sensation units throughout the entire range with the other patients showing a reduction in acuity for the higher frequencies. The case A. W. 143,210 was probably complicated by an old dietary deficiency while E. R. 117,222 shows a tone gap which was probably caused by liver pathology. E. G. 700,211 is an atypical case in which the ear changes were due to a localized condition of the conduction apparatus.

The head injury cases show rather variable changes depending on the location of the injury and the seriousness of it. It is to be remarked

that most of these cases entered the hospital in a comatose condition and the hearing could not be tested until many of the presenting symptoms had subsided. In many of them this would allow the real pathology to be removed. Case D. M. 696,919 was one of the most serious recorded. The hearing loss sustained in this case will probably become progressively worse, which is similar to the prognosis given regarding his eyesight. The cases presented for post traumatic symptoms all show considerable loss and in most of them the resulting deafness will undoubtedly be progressive. The case C. S. 727,191 was totally deaf in the left ear which was due to a pinching of the eighth nerve on that side.

The group of cases listed as brain tumor suspects are extremely interesting. It is difficult to say much concerning them in a general way except that as a group they show more hearing loss than any of the other cases and that the loss is more marked for high frequencies and generally more marked for one ear than the other. The case of M. B. 702,883 is interesting as at the time the gram was made the record showing past lues was not available and in reporting the acuity it was suggested that lues might have some etiological bearing. This was amply verified in the history which was obtained later.

Cases S. L. T. 731,090 and M. L. 694,884 are acoustic neuromas and both show marked unilateral deafness with the other ear effected somewhat, particularly for the high frequency tones. A post-mortem report was not obtained on either of these cases but the former gave the appearance of a choked labyrinth which would be in keeping with the extensive neoplasm found at operation.

The cases in which new growths were found in the forward part of the brain, but not in the frontal lobes, show a general lowering of acuity

that most of these cases entered the hospital in a comatose condition and the hearing could not be tested until many of the preauricular symptoms had subsided. In many of them this would allow the test battery to be removed. Case D. W. 528, 519 was one of the most serious recorded. The hearing loss sustained in this case will probably become progressively worse, which is similar to the prognosis given regarding his myelitis. The cases presented for post-traumatic symptoms all show considerable loss and in most of them the resulting deafness will undoubtedly be progressive. The case of C. S. 727, 191 was totally deaf in the left ear which was due to a pinching of the eighth nerve on that side.

The group of cases listed as brain tumor suggests are extremely interesting. It is difficult to say much concerning them in a general way except that as a group they show more hearing loss than any of the other cases and that the loss is more marked for high frequencies and generally more marked for one ear than the other. The case of M. B. 702, 688 is interesting as at the time the tumor was made the second hearing test was not available and in reporting the results it was suggested that there might have been bilateral hearing. This was apparently verified in the history which was obtained later.

Cases E. L. 7, 751, 630 and L. 684, 684 are acoustic neuromas and both show marked unilateral deafness with the other ear affected somewhat particularly for the high frequency tones. A post-traumatic report was not obtained on either of these cases but the former gave the appearance of a shaggy labyrinth which would be in keeping with the extensive neoplasia found at operation.

The cases in which new growths were found in the forward part of the brain, but not in the frontal lobes, show a general lowering of acuity

which becomes progressively more marked for tones above 1024 d.v. The ef-fect is generally bilateral but may be more marked on the contralateral side. The cerebellar growth cases show very little if any changes and are not at all distinctive.

Vascular lesions of the brain seem to cause a general lowering of the acuity with no specific effect on either the high or the low tones. The amount of loss sustained varies from case to case and is probably dependent on past bodily conditions as well as the extent of the resulting lesion. The resulting ear changes are due to changes occurring internal to the cochlea and not in the cochlea itself.

Syringomyelia and syringobulbia in the cases reported show nothing characteristic; the first appearing due to a general dyscrasia while the second show an abnormal lowering of tones above 4096 d.v. which is probably due to an early increased pressure which affected the acuity bilaterally.

Two cases of trigeminal neuralgia are recorded and both show markedly lowered acuity most noticeable for low tones which would point to a lesion of the conduction apparatus. Other facts entering appear to point to possible pathologic conditions located in the naso-pharyngeal region which would be an etiological factor in middle ear involvement.

Neuralgia of the eighth nerve causes a profound loss of acuity in one ear while the other is also affected but less markedly. The loss is spread over the entire frequency range but is greater for tones lying above 1024 d.v. The Weber is generally referred to the better of the two ears which is characteristic of a lesion of the inner ear. The history of the deafness shows that it has been progressive over a considerable period of time while extreme vertigo has been experienced for about the same length of time. The cases recorded as toxic or chronic labyrinthitis will probably

which becomes progressively more marked for tones above 1000 d.v. The effect is generally bilateral but may be more marked on the contralateral side. The differential growth causes show very little if any change and are not at all distinctive.

Vascular lesions of the brain seem to cause a general lowering of the acuity with no specific effect on either the high or the low tones. The amount of loss sustained varies from case to case and is probably dependent on past bodily conditions as well as the extent of the vascular lesion. The remaining ear changes are due to changes occurring internal to the cochlea and not in the cochlea itself.

Synergic and synergic in the cases reported show nothing characteristic; the first appearing due to a general decrease while the second show an abnormal lowering of tones above 4000 d.v. which is probably due to an early increased pressure which affected the acuity bilaterally. Two cases of bilateral deafness are recorded and both show markedly lowered acuity most noticeable for low tones which would point to a lesion of the conduction apparatus. Other facts concerning appear to point to possible pathologic conditions located in the naso-pharyngeal region which would be an etiological factor in middle ear involvement.

Neuralgia of the eighth nerve causes a profound loss of acuity in one ear while the other is also affected but less markedly. The loss is apparent over the entire frequency range but is greater for tones below 1000 d.v. The hearing is generally referred to the better of the two ears which is characteristic of a lesion of the inner ear. The history of the deafness shows that it has been progressive over a considerable period of time while extreme vertigo has been experienced for about the same length of time. The cases recorded as toxic or chronic labyrinthitis will probably

progress until they fall into the same class as the above.

The cases which show a lowering of acuity which is more marked for tones below 1024 d.v. was found to be referable to such types of pathology as chronic sinusitis or other types which would give rise to a catarrhal condition of the tympanum. If it be a suppurative type, the changes are readily detected by the appearance of the membrane, while the dry type may show no noticeable changes but compression will show an impairment of the motion of the membrane.

The psychoneurotics as a group are extremely variable. It is to be remarked that the reason for the diagnosis is that no definite pathologic changes can be located. Thus the hearing loss may be due to a real functional disability which is not demonstrable in other respects. The case of R.M., 741,378, is probably due to past diseases which the patient has had. Of those recorded, mumps would be the most apt to cause such a profound deafness; the patient was discharged before this information could be obtained and it has been impossible to contact him since his discharge.

Malnutrition which is generally accompanied by a vitamin deficiency seems to cause a lowering of the acuity about equally over the entire spectrum. In some of the cases the dysfunction seems to progress for higher frequencies but this appears to be due to age rather than to the specific neurologic changes. It would be extremely interesting to obtain post-mortem specimens on some of these cases and determine whether or not degenerative changes have occurred in the nerve tract or the end organ.

The syphilitics are interesting as a group. It is important to note that nearly all of them show a sharp drop on the acuity at 4096 d.v. which is in keeping with the report made by Drury*.

*Drury, D. W. Trans. Amer. Otol. Soc., 21, 221, 1931.

progress until they fall into the same class as the above.

The cases which show a lowering of acuity which is more marked for tones below 1024 d.v. are found to be referable to such types of pathology as chronic sinusitis or other types which would give rise to a constant condition of the tympanum. If it be a suppurative type, the changes are readily detected by the appearance of the membrane, while the dry type may show no noticeable changes but compression will show an impairment of the motion of the membrane.

The psychoneurotic as a group are extremely variable. It is to be remembered that the reason for the diagnosis is that no definite pathologic changes can be located. Thus the hearing loss may be due to a real (though slight) disability which is not demonstrable in other respects. The case of A. L., 341, 318, is probably due to past diseases which the patient has had. Of these recorded, mumps would be the most apt to cause such a profound deafness; the patient was discharged before this information could be obtained and it has been impossible to contact him since his discharge. Malnutrition which is generally accompanied by a vitamin deficiency

seems to cause a lowering of the acuity about equally over the entire spectrum. In some of the cases the dysfunction seems to progress for higher frequencies but this appears to be due to age rather than to the specific neurologic changes. It would be extremely interesting to obtain post-mortem specimens on some of these cases and determine whether or not degenerative changes have occurred in the nerve tract or the end organ.

The experiments are interesting as a group. It is important to note that nearly all of them show a sharp drop in the acuity at 4096 d.v. which is in keeping with the report made by Barry. In some of the cases which

Barry, J. A. W. Trans. Acad. Sci., 1931, 1932, 1933.

do not show this it is worthy of note that the diagnosis was made on the basis of serology reports without the corroboration of the usual primary or secondary lesions having been recorded. In other cases it seems that, due to a long standing condition, the higher frequencies have been lowered so that the curve does not take the usual appearance.

In conclusion it may be said that all of the cases reviewed here show a reduction in acuity. The epileptics and multiple sclerotics show the least marked changes. The Jacksonian epileptics are distinctive. The brain tumor cases all showed deafness, this being most marked for the acoustic neuromas and least marked for the cerebellar cases.

The frequency range lying above 1024 d.v. seems to be more affected by neoplasms and intracranial crises, excepting vascular lesions of the hind-brain. This also seems to apply to other conditions which cause an increased intracranial pressure. The syphilitics and the liver dysfunction cases show a peculiar tone gap at 4096 d.v.

Before definite conclusions are drawn regarding all types of cases much more clinical work must be done. It is important to have accurate clinical diagnosis in order to be able to properly correlate the findings with disease. There is also a necessity for more physiological work to be done on this subject, particularly with regard to the human.

do not show this it is worthy of note that the diagnosis was made on the basis of neurology reports without the corroboration of the usual primary or secondary lesions having been recorded. In other cases it seems that due to a lack of standing addition, the higher frequencies have been lowered so that the curve does not take the usual appearance.

In conclusion it may be said that all of the cases reviewed here show a reduction in activity. The epileptic and epilepticoid patients show the least marked changes. The Jacksonian epileptics are distinctive. The brain tumor cases all showed features, this being most marked for the epileptic patients and least marked for the epilepticoid cases.

The frequency range lying above 1000 c.p.s. seems to be more affected by neoplasms and intracranial crises, extending vascular lesions of the mid-brain. This also seems to apply to other conditions which cause an increased intracranial pressure. The syphilis and the liver dysfunction cases show a peculiar type of 6000 c.p.s.

Before definite conclusions are drawn regarding all types of cases much more clinical work must be done. It is important to have accurate clinical diagnosis in order to be able to properly correlate the findings with disease. There is also a necessity for more physiological work to be done on this subject, particularly with regard to the human.

PART VI

SUMMARY

One hundred and six cases are presented in this report, which have been studied audiometrically. The cases are grouped according to the disease for which they are hospitalized. Those having more than one ailment are grouped under the class of the principal disease, that is, the disease which contributes the most to the symptoms as a whole. The results of this study may be summarized as follows:

- (1) Idiopathic epileptics show very little in general except a possible slight lowering of acuity for very high tones, the two ears paralleling each other.
- (2) Jacksonian epileptics are generally more markedly affected for tones above 1024 d.v. and show a more marked unilateral affection.
- (3) Multiple sclerotics seem to drop about 20 - 30 sensation units throughout the entire spectrum with the older patients showing a greater loss for tones above 2048 d. v.
- (4) Brain injury cases show rather variable changes depending on the extent, location and seriousness of the injury. It is difficult to say what the results were immediately following the injury as the examination of hearing acuity has to be deferred until many of the original symptoms have subsided.
- (5) The group headed brain tumor suspects shows very greatly lowered acuity, generally more marked above 1024 d.v. Apparently one of the presenting symptoms is deafness.
- (6) The operated brain tumor cases are rather limited but all show hearing defects, more noticable in the higher register. The least noticable changes are recorded in cerebellar tumors.
- (7) The changes recorded in vascular lesions of the brain depend on the extent and region of damage.

The hundred and six cases are presented in this report, which have been studied audiotape. The cases are grouped according to the disease for which they are hospitalized. Those having more than one disease are grouped under the class of the principal disease, that is the disease which contributed the most to the symptoms as a whole. The results of this study may be summarized as follows:

- (1) Idiopathic epilepsy shows very little in general except a possible slight lowering of acuity for very high tones, the two ears being equal.
- (2) Jacksonian epilepsy are generally more markedly affected for tones above 1024 d.v. and show a more marked unilateral affection.
- (3) Multiple sclerosis does to drop about 20 - 30 sensation units throughout the entire spectrum with the older patients showing a greater loss for tones above 2048 d.v.
- (4) Brain injury cases show rather variable changes depending on the extent, location and seriousness of the injury. It is difficult to say what the results were immediately following the injury as the examination of hearing acuity has to be deferred until many of the original symptoms have subsided.
- (5) The group headed brain tumor aspects shows very greatly lowered acuity, generally more marked above 1024 d.v. Apparently one of the presenting symptoms is deafness.
- (6) The operated brain tumor cases are rather limited but all show hearing defects, more noticeable in the higher register. The least noticeable changes are recorded in cerebellar tumors.
- (7) The changes recorded in vascular lesions of the brain depend on the extent and region of damage.

- (8) Tic doloireux is accompanied by a conduction deafness, probably due to infection of the tympanum.
- (9) Neuralgia of the acoustic nerve is always presented with a marked deafness, one side being more affected than the other; while labyrinthitis may be either unilateral or bilateral.
- (10) The cases of middle ear deafness are most affected in the low tone region but are often complicated with inner ear changes which cause a concomitant high tone loss.
- (11) In the group of psychoneurotics each case is an entity and must be treated as such. This would be expected from the nature of the diagnosis.
- (12) Malnutrition seems to cause a general depression of the acuity. The drop is about the same throughout the tone range but for the older cases there is a progressive falling-off for the higher tones.
- (13) The hearing is always affected in syphilis. In the majority of cases there is a sharp drop at 4096 d.v. with a recovery for higher tones. This "dipper-gap" is apparently wiped out in some cases due to loss of acuity for the frequencies above 4096 d.v.
- (14) The hearing loss in migraine cases seems to be more noticable for low frequencies but the higher tones are also somewhat affected. This is probably due to body toxemia.

It is important to note that a sufficient number of cases of any one disease to make a statistical study and obtain the average hearing loss for the group, are not at hand. It is the thesis of this paper, however, to show that hearing acuity is affected by generalized, bodily crises and this viewpoint has been amply justified in the cases presented.

In making the test, it is important that the examiner be constantly

(8) The behavior is accompanied by a condition of distress, possibly due to infection of the tympanum.

(9) Neurosis of the acoustic nerve is always presented with a marked deafness, one side being more affected than the other; while labyrinthitis may be either unilateral or bilateral.

(10) The cases of middle ear deafness are most affected in the low tone region but are often complicated with inner ear changes which cause a concomitant high tone loss.

(11) In the group of psychoneurotic cases there is an early and rapid recovery as such. This would be expected from the nature of the diagnosis.

(12) Malnutrition seems to cause a general depression of the body. The drop is about the same throughout the tone range but for the higher tones there is a progressive falling-off for the higher tones.

(13) The hearing is always affected in a typical manner. In the majority of cases there is a sharp drop at 4000 d.v. with a recovery for higher tones. This "dipper-gap" is characteristically wiped out in some cases due to loss of acuity for the frequencies above 4000 d.v.

(14) The hearing loss in migraine cases seems to be more noticeable for low frequencies but the higher tones are also somewhat affected. This is probably due to body toxemia.

It is important to note that a sufficient number of cases of any one disease to make a statistical study and obtain the average hearing loss for the group, are not at hand. It is the thesis of this paper, however, to show that hearing acuity is affected by generalized, bodily crises and this viewpoint has been easily justified in the cases presented.

In making the test, it is important that the examiner be continuously

alert for possible errors. The type of patient must be considered and the lethargic or moron types must be constantly reminded in order that they respond with approximately correct answers. They must also be checked in order to determine whether or not they are malingering. The method of dealing with patients can be evaluated only by experience with actual cases and the development of a technique which gives the desired results.

PART TWO

PSYCHOGRAPHY

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 spond with approximately correct answers. They must also be checked in
 order to determine whether or not they are willing to. The method of train-
 ing with patients can be evaluated only by experience with actual cases and
 the development of a technique which gives the desired results.

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PART VII

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I was born on the 22 of May in 1905 in Petitcodiac, N. B., Canada. I am the oldest child of Alexander R. Lutz and Eva B. Lutz (nee Killam) and have one sister who is five years younger than myself and a younger brother who is deceased. I removed to Bangor, Maine with my family at the age of two and one half years where I resided until the age of eighteen years. My common school education was received in the public schools of that city up to the third year of high school when I transferred to the high school in Brookline, Mass, from which I was graduated in 1925. I then entered Massachusetts Institute of Technology from which I received the degree of S.B., in Physics, in 1930. The degree of S.M., without specification, was granted from the same institution in 1932.

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